ELEMENTS OF PSYCHOLOGY

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PREFACE.

THIS book has been prepared in response to a request from a number of teachers of psychology in the universities who suggested that the expense and length of my *Handbook of Psychology* precluded its use as the text in their courses of instruction. I have, accordingly, aimed to make a book which shall present the newest essentials of the science in a single compact volume at reasonable cost. It differs from my larger work mainly in its omissions. I have endeavored, however, to simplify the exposition throughout, often rewriting whole sections or recasting whole chapters with this in view, and adding more illustrative facts and explanations.

The treatment of the nervous system has been put at the beginning—a pedagogical concession to my critics, to which I ask attention as unanimous as their criticism. In regard to other alterations—respecting which the critics' opinions have largely neutralized one another—I have depended as before mainly on my own judgment. What these alterations are the book is here to show. I am sorry that the doctrine of "Feeling" has not aroused the approval in its readers that the doctrine of "Belief" has. It is stated more clearly in this book; but it is the same doctrine, and—may everybody be converted! Finally, I have added before the first chapter a short glossary of terms likely to embarrass the student at the beginning of his study; and instead of burdening the pages with references to the authorities, I have given at the outset once for all the general works (English mainly) in which detailed and

exhaustive expositions may be found. A reference to the corresponding fuller treatment of my own larger work is given at the beginning of each chapter.

I may add that I am grateful to all who have done my work the honor of reviewing, teaching, or reading it; especially to the reviewers. One who is conscious of his own sins feels the more the humanity of the physician who forbears to probe them too deeply.

J. MARK BALDWIN.

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GLOSSARY OF TERMS.[1]

Presentation: a *mental picture* or *image*, any *object* of knowledge or thought.

Representation: the same when *remembered* or *revived*.

Presentative: having reference to an *object* of consciousness.

Idea: a mental state of any kind, considered as subject to reproduction or revival.

Subjective: belonging to the *subject*, i. e., to consciousness itself.

Objective: belonging to things considered as *objects* of consciousness.

Empirical: belonging to or derived from the *observation of single phenomena*; derived from *experience*.

Experiential: the same.

Empiricism: the doctrine that all knowledge is derived *exclusively* from experience.

Intuition: (1) the act of *looking at directly*, without a medium of any kind; (2) the *information* reached by such an act; (3) knowledge is *intuitive* or *rational* when it is open to immediate inspection, i. e., needs no *proof*.

Rational: applied to knowledge in about the same sense as intuitive, above.

Intuitionalism: the doctrine that some knowledge is intuitive, i. e., not derived exclusively from experience; opposed to Empiricism.

Phenomenon: an *event*, change, happening, of any kind.

Synthesis: (1) a union of *elements* in which these elements are themselves *hidden*; (2) the process of uniting elements as described.

Integration: (1) a union of *elements* in which these elements are still *evident*; (2) the process of bringing about such a union of elements.

Function: (1) an *activity*, process, or performance (applied to organisms); (2) an *expression* for, or way of stating a thing (mathematical use); (3) a *regular* appearance of, or event in (consciousness: use in psychology).

Relative: in a degree *dependent*.

Absolute: not relative: *independent*.

Content: material, or *filling*.

Form: that which sets limits to a content; that which is *filled*.

Postulate: a *presupposition*.

Hypothesis: a postulate put forth to explain a set of observed facts.

Inductive: resting on *observed facts*.

Deductive: guaranteed by a *general principle*.

Affective: happening in consciousness but not referring to an object; opposed to *presentative*.

Co-efficient: an *essential peculiarity*, or distinguishing mark; a *standard*, or normal value.

Dynamic: progressive, *forceful*, causal.

[1] The best way for the student to become familiar with the use of these words is simply to neglect this list until he come to the terms one by one in the body of the book.

Genetic, belonging to the origin or birth.
Reaction, response, *discharge*.
Sensor, stimulating, or contributing to, sensation.
Motor, stimulating, or contributing to, movement.
Afferent, transmitting toward the brain; sensor; *centripetal*.
Efferent, transmitting away from the brain; motor; *centrifugal*.
Periphery, outside, surface (of the body).
Peripheral, belonging to the periphery.
Central, belonging to, or located in, the nerve centers, or gray matter of the nervous system.

REFERENCES.

The student may consult with profit the expositions given, from different points of view, in the following works, where full references to further literature may also be found:

James, *Principles of Psychology* (2 vols., Holt and Macmillan).
Höffding, *Outlines of Psychology* (Macmillan).
Sully, *The Human Mind* (2 vols., Longmans).
Ladd, *Elements of Physiological Psychology* (Scribners).
Ribot, *German Psychology of To-day* (Scribners).
Bain, *The Senses and the Intellect* (3d ed., Longmans).
Bain, *The Emotions and the Will* (3d ed., Longmans).
Wundt, *Grundzüge der Physiologischen Psychologie* (2 vols., 3d ed., Engelmann, Leipzig).
Wundt, *Vorlesungen über die Menschen und Thierseele* (2d ed., Voss, Leipzig).
Volkmann, *Lehrbuch der Psychologie* (3d ed., Schulze, Cöthen).

References to the author's *Handbook of Psychology* (2 vols., Holt and Macmillan) are given at the beginning of the several chapters of this book.

ELEMENTS OF PSYCHOLOGY.

INTRODUCTION.

CHAPTER I.

NATURE OF PSYCHOLOGY.[1]

§ 1. DEFINITION.

Subject-matter of Psychology. We may define psychology as the *science of the phenomena of consciousness*, being careful to include consciousness wherever and in whatever stages it be found; or, if we emphasize, not so much the facts with which we deal, as the mode of our knowledge of these facts as *the science of mind as we know it*.

By "phenomena of consciousness" we mean happenings or events in consciousness, everything that belongs to our minds; sensations, impulses, acts of will, reasoning processes, etc.

The question of psychology is: "Is there an order of mental facts apart from the phenomena of the physical sciences and especially physiology?" This question is sometimes answered negatively. Psychology, we are told by the materialists, is properly a branch of physiology:

[1] *Handbook*, vol I chap i. A footnote reference such as this is given at the beginning of each of the following chapters to indicate the fuller treatment of the corresponding topics in my *Handbook of Psychology*. Full references for further reading are to be found at the end of the several chapters of the *Handbook*.

since physiology, as the science of the functions of the bodily organs—the lungs in respiration, the heart in circulation—includes the function of the brain, which is thought. Psychology thus becomes a special chapter in physiology.

This identification of mental facts with organic and vital facts is wrong. There exists between the two orders of facts a radical opposition in several particulars.

Distinction between Psychological and Physiological Facts. The opposition between these two classes of facts takes several distinct phases.

I. *Relation to Movement.* The organic functions are simply movements of the organs of the body, that is, movements of matter in space. The functions of digestion and circulation are the physical activity of their respective organs, and the science of such functions is nothing more than the complete knowledge of these movements. With thought or feeling the case is very different. Without doubt thought has some of its conditions in the brain, and yet we cannot say that thought is movement. The most that can be said, by the most advanced materialism, is that thought is an effect or result of cerebral movement. Let the movement be what it may and let the mental fact be what it may, there is nothing in common between them. Something must be added to movement to give feeling. The fullest knowledge of the brain would not lead us to suspect the existence of such a thing as thought if we did not know it already in consciousness. If an animal for example, says M. Rabier, experienced sensations quite different from any we know, the most exact knowledge of what takes place in the brain of the animal would throw no light upon their nature; just as full knowledge of the auditory and visual apparatus gives no idea of sound or color to the man born deaf or blind.

For this reason, we cannot speak of thought as occupying space or as having exact locality. All such forms of

expression will be seen, upon examination, to refer properly to the physiological accompaniment of thought. For example, we speak of the localization of speech in Broca's convolution; but it is the brain modification which accompanies speech that is there located. Suppose all our words were impressed upon the brain, making it, as some seem to consider it, a kind of magazine of photographic plates, still the great mental essential, consciousness, might be wanting.

II. *Relation to measurement: mental facts, unlike physical facts, cannot be directly measured.* For the measurement of external magnitudes extension affords us at once definite and constant standards; but for states of consciousness we have no such exact means of procedure. The fact that mental events are subjective in their nature makes them liable to all the uncertainties of subjective estimation. This difficulty is further enhanced by the consideration that the mental fact is always associated with a physical fact, and it is impossible to isolate the former. This is seen in both the cases in which physical measurements seem to be most successful; in the measurement of the duration of mental acts and of the quantity or intensity of sensations. In the former case we proceed upon the supposition that time standards can be employed for mind as space standards for body: but the time occupied by the cerebral event is so interwoven with that of the mental that it has proved impossible to separate them.

III. *Mental states are distinguished from physical states in the means through which they are known.* As modifications of matter, physical facts are known through the senses. Bodily functions are thus laid open to the gaze of the physician and the anatomist. The brain itself may be observed in its activities after the operation of trepanning. But mental states escape all such observation. They are known, on the contrary, in an immediate way through the consciousness of the individual. And while we are able to

observe and analyse the physical processes of others, our immediate knowledge of mind is limited to ourselves.

IV. *The most essential characteristic of mental states is their subjective nature;* what we may call their *inner aspect*, in the phraseology of late science. By this is meant that relation to a self or subject that makes them what they are in distinction from outer phenomena, which, as far as we know, have an existence apart from such a reference. This distinction is admitted even by those who reduce the two classes of phenomena ultimately to a single principle. This fact of a self affected becomes in developed mental states a matter of reflection and differentiation from the not-self; a distinction arising, as will appear, within the inner aspect, and impossible without such a subjective beginning.

V. *The method of mental activity is quite distinct from that of the physical forces.* As we proceed we shall find a constantly recurring fact of mental synthesis whereby, by conscious mental activity, states of consciousness are gathered and unified in new products themselves apparently simple and original. In the physical world we find no such unifying force as that known in psychology as the activity of apperception.[1]

True Relation of Psychology to Physiology. These two orders of facts lead us to two distinct sciences—equally sciences of fact or natural sciences. Psychology cannot be a chapter of physiology, because the methods and results of physiology do not reach nor involve mental data. One is a subjective science and the other is an objective science, and the difference is strictly experiential.

The absolute separation of psychology from physiology, however, in point of matter, does not imply their independence of each other in point of fact. They are united in fact by a bond which finds analogy only in that which unites the science of the inorganic, chemistry, with that of life, biology. Life introduces a new series of phenomena

[1] Treated below

into nature, but the morphological changes it produces are accomplished only through the processes of inorganic or chemical change. So psychology, while introducing a new order of phenomena, proceeds immediately upon the data of physiological change. The connection of the two is as real as their separation. The physiologist often finds the causes of organic modification (facial expression) in the movements of the mind, and the psychologist likewise finds causes for mental modification (sensation) in states and functions of the body.

§ 2. Difficulties and Errors in Psychology.

It has already been said that consciousness is the one characteristic of what we denominate mental. The difficulties and errors, therefore, that arise in psychology must be difficulties and errors either in the reports or in the interpretation of consciousness. There can be no doubt that there are such difficulties and errors, for otherwise the science would be much more developed than it is. They cannot arise in the actual reports of consciousness, for by its intimate nature as immediate feeling of inner states it reveals what actually is and happens. Considered, then, as arising from the interpretation or mental building up of the data of consciousness, several kinds of error may be pointed out.

I. *Difficulty of distinguishing Consciousness from Association and Inference.* The primitive data of consciousness are no longer presented simply in adult life, but carry with them a mass of complex and derived material. "Hardly has consciousness spoken," says Mill, "when its testimony is buried under a mountain of acquired notions." The fact that there is a higher and lower in the mental life—a development from first things—is sufficient to show the reason of this confusion. For example, we shall find in studying sense-perception that the localization of things in space, which seems to be an immediate act of conscious-

ness, is really due to a very complicated construction from data of sensation, and the general process of memory carries with it an instinctive belief in the reality of our images, due largely to association, which leads us often into illusion. So marked do these difficulties and confusions become in the higher processes that some additional safeguard must be resorted to: some method of reducing complex mental states to the simple data of consciousness. This resort is found in *Conscious Reflection.*

Use of Reflection. Even though the necessity spoken of did not exist, still simple consciousness, however clear, would not be sufficient for science. Consciousness is knowledge of present states, new and revived, and gives us only a play of present conditions. The scientific observation of mind demands more than this. It demands the turning back of the powers of thought and reason upon our immediate knowledge for its examination, testing, systematization. Simple observation does not suffice for the science of physics, nor will it, for the same reason, for the science of psychology.

By reflection, therefore, consciousness itself becomes a matter of consciousness. To observe consciousness I must stand aside, so to speak, apart from myself and report what takes place in myself. If it is attention which I wish to observe, I must attend to the act of attention, in order to describe it. There is in such reflection a species of secondary or subordinate consciousness, from the ground of which we look in upon our primary self. This apparent doubleness, or the effort to place ourselves beyond the range of our own states in reflection, leads to new sources of difficulty.

II. *Disturbing Effects of Reflection.* Reflection, considered as the turning in of the mental processes upon themselves, necessarily, by a great law of attention, exerts a disturbing influence. All our mental states are rendered more intense by the attention;[1] consequently as soon as the

[1] Treated below.

state observed comes within the range of fruitful observation, it is changed, both in its own integrity and in its relative importance in the mental life. A pain attended to, for the express purpose of estimating its intensity, becomes more intense. Operations, also, which demand close application or successive mental efforts, are completely suspended by reflection. A difficult logical problem or musical performance becomes more difficult or impossible of accomplishment when, by reflection, we note the stages of the process. Mental effectiveness seems to require a single direction of consciousness. On the other hand, also, certain states of mind make reflection impossible, their temporary importance in consciousness being overpowering: such as strong fear, anger, and the emotions generally. But psychology, as a science, cannot dispense with the complete knowledge of such states, since they are sometimes most important and enlightening. Indeed aggravated states, especially when they become manifestations of mental disease, generally cast most light on the normal processes from which they arise.

Means of Remedying these Difficulties: Supplementary Psychological Sources. In view of these limitations, the psychologist is thrown back upon any other means he may command to correct, complement, and enlarge the scope of reflection. In general these supplementary sources of information are internal and external.

I. *Internal Source: Memory.* The errors of internal reflection which arise from the deranging effects of attention may be remedied in large part by memory. Mental states which cannot be made the object of immediate examination in the present, may be recalled from the past and held before the attention as reproduced images. The facility with which the mind does this is quite remarkable. Frequently an experience which is obscure or meaningless, an unknown sound, an unrecognized face, a vision, is thus recalled and given a rational explanation. The psychologist often

catches himself just emerging from a state before almost unconscious, which, being brought back in vivid detail, is of especial value and fruitfulness for his psychological theory.

This fact of memory is further strengthened by the phenomenon of after images or after sensations—traces left in the mental life after the actual stimuli have ceased to act. Of these we shall speak more in detail. There is a vibratory persistence in the nervous organism which tends to continue the central process and its accompanying mental state. And the same residuum or after-effect is also probably a mental necessity, since time is needed for the shifting movements of attention in its transition to new experiences; during this period there is nothing to drive the former experience from consciousness, and it persists a noticeable time.

II. **External Sources.** If it is impossible to deny the utility of inner observation, it is almost equally dangerous to depend upon it exclusively. Failure to resort unceasingly and repeatedly to external observation at every stage of our study leads to the most chimerical subjective systems and the most one-sided views of life. So evident is this that, even when most strongly emphasizing the inner source of data, psychologists have found it necessary to lay hold upon whatever certified records of others' experiences in health or disease they found available, and held them up as valuable. Among these external sources we may enumerate the following, to which it will be necessary from time to time to refer:

1. *Race Psychology.* This is, in the first place, the study of mind in its social characteristics, and in its products in society, the state, religions, customs, and institutions. It accepts all the results of anthropology and views them as the manifestations of the mind. It examines ancient philosophies, cults, and civilizations; literatures, history, laws, mythologies, traditions, the sources from

which the human mind has drawn its culture in all ages. It values the reports of travelers in respect to savages, heathen, and degenerate races; the conditions of social life everywhere. For in all these manifestations of the life of the human mind, we have direct information respecting its nature and capacities.

2. *Animal or Comparative Psychology.* As might be expected, the study of animals is of extreme importance for our science; for animals show striking evidences of the phenomena of consciousness both in its lower and in many of its higher forms. It is perhaps destined, judging from the contributions it has already made to some departments of research, to throw as much light upon human psychology as comparative anatomy has upon human physiology. As is the case with many physical functions, so certain intellectual states are seen in animals in a less developed and complex state, or in a more sharpened and predominant state, than in man; and thus the necessity for a genetic study of these states is met to a greater or less degree. Instinct, for example, attains its most perfect form in animals, memory is often remarkably developed, and certain of their senses show a degree of acuteness which we would never expect the corresponding human senses to possess. And the study of animals for psychological purposes is not limited to observation of their habits, productive as such observation is; but the physiological method is capable of much more extended use than in experiment upon man. Condemned animals may be directly used for purposes of neurological research under conditions which rule out all pain to the creatures. The variety of problems which may thus be resolved is limited only by our ability to state them and our ingenuity in planning the experiments.

3. *Infant Psychology.* The importance of the early study of mind is to be equally insisted upon. By it mental facts are reached, as far as they ever can be, at their origin

and in their simplest form. It is more important to know what mind is than what it becomes. The child serves to correct the reports of adult life by opening up object lessons in the growth of mind. At the outset the child mind is lower than the highest animal mind, since, while its human possibilities have not emerged, its instinctive equipment is not as varied as that of animals; but in its rapid development it exhibits the unfoldings of organic mental growth in correspondence with the growth of the bodily system, an advantage found in none of the other fields of observation.[1]

4. *Abnormal Psychology.* As in the former sources of information we deal with mind in health here we come to consider it in disease: that is, we look to all abnormal or diseased conditions of the mental life for light upon its nature and upon its legitimate operations. It includes all cases of variation from the normal and healthy activity of conscious mind: sleep-walking, dreams, insanity in its multiplied forms, loss of memory, loss of speech, hypnotism, idiocy, hallucination, disturbances of consciousness generally. All these variations afford—as such variations in any science afford—instructive views into the working of mind in its most intimate character. And the reason for this is plain. Such cases offer immediate occasion for the application of the logical *method of difference*, which consists in removing part of a cause or effect and observing the consequent variations in the corresponding effect or cause. This procedure enables us to attach an effect to its true cause. One most general result of the study of mental disease, for example, is this, that we have learned to seek its cause in diseased conditions of the body, rather than in obscure mental movements or supernatural influences. It has been well said that a man deprived of one of his senses from birth is a subject especially prepared

[1] On the problem and method of Infant Psychology, see my article in *Science*, December 26, 1890.

by nature for the application of the method of difference. The science of mental disease and its cure is called Psychiatry.

§ 3. Unity of Psychological Sources in Consciousness.

From the external standpoint, psychology stands upon a level with the other sciences of observation; but by the addition of inner experience it attains a unity they do not possess. The medium of all observation of nature, consciousness, which does not enter as part of the material of other sciences but often acts as a hindering cause, here serves within the circle of the science itself a useful and important rôle. The interpretation of facts, called in science the "personal equation," is in psychology an act of essential value, since data for psychology can be explained only from the point of view of mind. In short, external observation, which is necessarily of the physical, and of the mental only through the physical, must be translated into the forms of our own inner life. The ultimate basis, therefore, of psychological interpretation and construction is the mental experience of the individual, in so far as it is normal and typical.

CHAPTER II.

PSYCHOLOGICAL METHOD.[1]

§ 1. PRINCIPLES OF SCIENTIFIC METHOD.

In General. The question of method is an important preliminary to all scientific work. It involves the two great questions, first, what is the destination, and second, what is the road to the destination. In the preceding chapter, in the consideration of the subject-matter of psychology, the former has been considered. It remains to inquire into the latter; through what means or by what kind of procedure shall we investigate the matter before us in order to reach the most general and exhaustive results?

This problem is practically solved for us in the method of the objective sciences. For if, as has been said, psychology is a science of fact, as they are, and proceeds by the observation of a given class of facts, as they do, then the tried method of procedure which they employ will be most productive here.

True scientific method includes the three following processes, the first two of which belong more properly to Induction.[2] First, *Observation;* by which is meant the widest possible appeal to fact, by way of an actual understanding of the cases in hand. It must be extended to include all reliable testimony. The broad defining marks of the material treated of become thus apparent and great classes are reached. This constitutes natural history, rather than natural science; it describes the subject-matter but does not explain it. Second, *Experiment;* which consists

[1] *Handbook*, vol. I chap. II.

[2] On Induction and Deduction see the chapter on Thought.

in the varying of the conditions under which the facts are observed. It leads to the discovery of essential reasons or causes. It proceeds by certain subordinate methods or canons of its own, called since Mill "canons of induction." The product of experimental research is the *Hypothesis* or *Empirical Law*: a more or less probable conjecture, based upon the results of experimentation, as to the true cause operating in the case in hand. This is, in so far, no longer a description merely, but an explanation. Third, *Deduction*; which is the final stage in scientific method. By it the general principle set forth in the hypothesis is made applicable to successive individual cases, and by a new appeal to experience the truth of this application is made sure. Each such successful application tends to establish the hypothesis more firmly until it reaches the rank of a principle or *Law of Nature*.

§ 2. APPLICATION OF SCIENTIFIC METHOD TO PSYCHOLOGY.

The application to psychology of the principles of method just mentioned is, in the main, clear; yet many questions of lively debate arise in consistently carrying them out. The two great spheres of their operation are the two sources of psychological data, internal and external.

Psychological Observation. I. *Internal.* As a means of access to the phenomena of mind we find available three distinct phases of inner observation. In the first place, the simple fact of *Consciousness*, that inner aspect which makes mental facts what they are, in its primitive form, is at once awareness of the states of self. However vague and indefinite this primitive awareness is at first, it is still a beginning. There is no experience in conscious life which leaves absolutely no trace of itself. Once it is an experience, a modification of subjectivity; then it may become the object of the developed act of inner observation. The first fleeting sensations of the child, when

there is no subject or object, no store of memory images, no idea of self, exhibit in isolation the kind of primitive consciousness that lies at the basis of all knowledge of self. In adult life these experiences are assimilated to the developed forms of intellect and their separate meaning is lost. But in this category are included the vast number of first experiences as they pass steadily on in time, something every moment; and all the information we glean from them before we recall, examine, and reflect upon them. Second, the state of mind called *Primary-memory*: the lingering in consciousness of an event just after the event itself is gone. The immediate past hangs around us as a line of trailing cloud on the horizon of consciousness. So speedy and involuntary is this presence of the shortly-past that it is sometimes considered the first stage of our inner observation; yet this cannot be held in the sense of denying the immediate awareness of the primitive consciousness. For example a loud noise, or a spoken word, may be unintelligible until its quick recall enables us to recognize it. We have had, in these cases, the "immediate awareness" of the first event, but the examination of the after-image which it leaves adds much to the scientific value of the experience. Third, we reach *Reflection*, or conscious observation. By reflection is meant the inspection of the events of the inner world as distinct objects of our knowledge. It is the highest form of internal observation. Thus, by reflection, inner happenings are built up into hypotheses concerning the nature and processes of the mental life. This constitutes the point of departure for the second stage in the finished scheme of method.

II. *External Observation.* By the method of external observation we approach the various external sources of psychological data mentioned in the last chapter. The closed nature of the individual consciousness makes it impossible that the consciousness of others should be reached except through the interpreted meaning of external signs.

All the products of human genius and culture become thus the objects of observation, with a view to bringing the detached parts of truth thus discovered into harmony with our individual experience. So, also, the observation of children and animals brings its rich contribution.

By simple observation, however, in psychology, as is the case in the material sciences, we do not reach below the surface. Many claim that this is all that we can do, and that a description of mental facts is the true aim of the science. Yet, as rare as true description is in this field, and as broad a field for analysis as simple observation affords, we find ourselves asking: Is there no means of breaking up the complex groups of mental states, of detaching individual mental movements from the enormous mass of interwoven threads which our adult thought presents? In short, is there no field for experiment, either internal or external, in psychology? We answer, as recent research is answering, that there is—but with important conditions and qualifications.

§ 3. Experiment in Psychology.

The need of experiment in psychology is exceedingly great. When we remember that, in the search for causes in the natural world, the difficulties are vastly enhanced by the fact that single causes are never found at work alone, and that it is the function of experiment so to eliminate elements in a causal complex, that isolated agencies may be observed at work; and when we further reflect that no single function of mind is ever found operating alone, but that all accompany and modify each—the inadequacy of simple observation in this field becomes apparent. A sense stimulation, for example, may arouse an intellectual train, an emotional outburst, a course of action; are all these the effects of a single cause? A course of action, conversely, may result from an emotion, a thought, a memory, an association, a sensation, an inspiration; can

the simple description of the resulting action indicate which is its cause? Antecedents and consequents are thrown into the mental life in inextricable confusion. External or bodily causes—an odor, a spoken word, a pain, an internal organic movement—may start a train. This train may be hindered or advanced by a thousand considerations or emotions; other bodily or mental causes may modify it. And all together make up the cause or complex antecedent state; while vague analogies of thought and feeling, such as temperament, heredity, education, make variations between individuals, and the present condition of the brain and nerve centers makes variations in the same individual. How can we single out the cause, in this network, by observation? It is as vain as to discover the cause of a conflagration from examining the blaze; was it a match, lightning, friction, chemical composition? Only one step can determine: the reconstruction, under artificial circumstances, of the conditions, and the endeavor to exhibit a single isolated cause. This is experiment. We may look at the case, as before, from the points of view of the internal and external approach to mind.

I. *Internal Experiment.* The range of internal experiment is very contracted, from the fact that it is hard to induce artificial states of mind entirely from within. Yet we can often suggest things to ourselves that change the course of our thought and give us a plainly isolated effect. We can force ourselves into lines of thought or emotion by holding given images fixedly before the mind—such as a shocking murder or the death of a close friend—and watch the result in the flow of emotion. On a larger scale one can subject himself to a series of intellectual influences and note the change it works in his habits of thought and feeling. The actor has thus constantly to experiment with his emotional states, cultivating those which adequately portray the character he represents. All such intentional manipulation of consciousness, however, demands a high

degree of mental control and concentration, great delicacy of observation and fidelity of description, to be of use for the general science.

Experiment of this kind, however, is more effective upon others than upon ourselves. The whole possibility of suggestion to others is here open to our touch, and we may play upon their emotions, hopes, ambitions, plans, ideas, as upon the keyboard of an instrument. We are all more or less skilled in such experiment; we suit our advice to the man—offering a money inducement to one, a position of honor to another. So educational methods proceed upon experimental knowledge of others: the awarding of prizes, the use of object lessons, appeals to individual manliness, corporeal punishment; indeed all discrimination in the treatment of children proceeds upon such experimental knowledge. In the hypnotic state and in infant life[1] an unlimited range of suggestion is open to the investigator, and in sleep the same kind of influence is possible though to a much more limited degree.

II. *External Experiment.* The possibility of finding that a bodily or external cause has been the determining factor in a mental result, opens up to our view the sphere of external experiment. We are at once led to see that a series of experiments upon the body may be devised, and the results ascertained which follow in the conscious life; that is, reversing the relation of cause and effect which ordinarily obtains, we may consider bodily modifications cause and their accompanying mental modifications effects; thus isolating mental facts through artificial and single physiological stimuli.

That such a procedure is justified is seen from the fact that our daily lives are full of inferences of this kind. The connection between the physical and the mental is so close and unquestioned that we never fail to take it into

[1] See my article "Suggestion in Infancy," in *Science*, February 27, 1891.

account. Many states of mind are treated as arising directly from states of the body. The whole treatment of mental disease proceeds upon this basis; and sensations, the material of knowledge, are known to arise from direct sense-stimulation. The effects of alcoholic stimulants upon the mind are plain. The elevation, however, of this rough sense of connection between mind and body into a law of scientific method is only now getting general recognition. Its results constitute what is called "physiological psychology."

General Conclusion. We are thus led to the following general conclusion as to the nature and method of psychological inquiry: There is, first of all, in consciousness a kind of activity which affords at once the necessity and the justification of a higher science, inductive, internal, descriptive, and analytic; that its method is that of direct observation; and that, inasmuch as the phenomena of which it is cognizant are purely mental, it must precede and embrace those branches of the science which deal with the phenomena of body. Second, these mental phenomena sustain an universal and uniform connection with the bodily organism through which physiological experiment becomes possible, carrying with it a twofold utility: the causal analysis of phenomena and the confirmation of their empirical generalizations. And third, the science can never reach completion, or its laws attain their widest generality, until all mental facts are interpreted in the light of this connection with body or shown to be independent of it.

CHAPTER III.

THE NERVOUS SYSTEM[1]

§ 1. Its Structure.

The fact that body and mind are connected so closely, and that true psychological method must proceed upon this connection, makes some preliminary knowledge necessary of the nervous system and its functions.

Nerve-elements. As far as our knowledge goes, we are able to make a twofold distinction among the elements called nervous, *nerve-fibers* and *nerve-cells*. As to what these are, the general meaning ordinarily attached to the words expresses about the amount of knowledge physiologists possess. That is, a nerve-fiber is a thread-like *connection* between different muscular and cellular masses. A greater or smaller number of these white thread-like fibers may unite together to constitute a "nerve," which connects an organ (muscle, gland, etc.) with a greater or smaller mass of cells. The cells, on the other hand, are microscopic elements shaped like a flask or long-necked squash. One of the necks—for there may be more than one—seems to be prolonged into the fiber, and is called the *axis-cylinder process* of the cell. Both cells and nerves have *nuclei*, small dark points which are surrounded by protoplasm. The nerves are also cut up at intervals by *nodes* resembling the divisions in a length of corn-stalk. See Figs. 1 and 2.

Some cells, however, are found without such connections, as far as microscopic analysis is able to go. And in many cases no direct continuity of structure has been discovered

[1] *Handbook*, vol. II. chap. I.

between cells and fibers which are supposed to unite in a common function. In these cases the fiber divides into numerous ramifications, presenting the appearance of a tree with its top branches turned toward the cell. See Fig. 4.

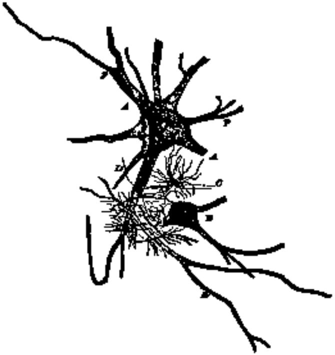

FIG. 1.—From a piece of spinal cord. A and B, ganglion-cells; at C, axis-cylinder; P, protoplasmic process; C, neuroglia-cells. (After Ranvier, from Edinger, [illegible])

The cells are largely gathered in masses or "centers," toward which fibers from different regions or organs converge and apparently lose themselves. What is usually called the brain is a series of such centers, varying in size and complexity from the cerebral cortex or rind, downward into the spinal cord. In the centers the cells are

separated by a substance called *neuroglia* (see Fig. 1), which may be simply a form of connective tissue not itself nervous—the opinion of the majority of neurologists—or a third nervous element whose function is bound up with that of the cells—a view supported by some later research.

Combination of Nerve-elements in a System. The elements spoken of somewhat artificially as cells and fibers have no functional existence apart from each other and from the living organism as a whole. Viewed as a whole, as receiving, registering, and reacting upon stimuli, they constitute the nervous *system*. As a system, the nervous apparatus is essential to the life of a higher organism and partakes with it of a great differentiation of parts. What we call organs or members of the body have a unity of their own structurally; but their functional activity is one with the general life-process of the whole. So the organs or members of the nervous system have a corresponding structural differentiation. Whether the three general functions of the system spoken of above, receiving, registering, and reacting upon stimuli, are in any way adequate as a functional conception or not, they will at any rate serve to guide us in describing the three great parts or divisions of the nerve-apparatus. We will accordingly say a word about these three divisions in order.

Fig. 2.—Nerve fibers (after Schwalbe). a, Axis cylinder; s, sheath of Schwann; n, nucleus; p, granular substance at the poles of the nucleus; r, Ranvier's nodes, where the medullary sheath is interrupted, and the axis-cylinder appears.

The Receiving or Sensor Apparatus. By this is meant that part of the

nervous system which is normally concerned with stimuli from without. We say normally concerned, since there is reason to believe that all nerve-tissue has the receiving property. But we find a great system of fibrous pathways arranged for the evident purpose of propagating disturbances from the periphery of the body, and from various organs, to the higher centers. Further, these fibrous pathways may have special receiving organs exposed to the peculiar stimulus which we call psychologically the stimulus to a particular sensation; such special organs being peculiar to the special senses, as the eye for sight, ear for hearing, etc. Accordingly, the receiving apparatus includes two distinct elements, the *sensor course* and the *end-organ*. The latter (say the eye) receives some form of excitation (light), and the former (optic nerve) propagates it to the brain.

The existence of sensor courses which have no end-organs is sufficient to show that the latter is not a necessary part of the system, except when the system is highly differentiated. A sensor nerve may be stimulated mechanically by a blow, by a touch upon an exposed point, etc., even in the case of the nerves of special sense; they then report the sensations ordinarily secured through their end-organs.[1]

The nerves of special sense show no structural peculiarities except the possession of the end-organ. By nerves of special sense are meant those which report sensations recognized and classed as having distinct psychological *quality*. That is, we find special end-organs for each of the seven classes of sensations discussed below, the muscles being considered end-organs of the muscular sense.

Besides these, there is a mass of nerve-courses which report less distinctly differentiated and localized stimuli, the purest and most general psychological condition that

[1] For example, sparks of light which result from a blow on the optic nerve or from mechanical irritation of a blind eye.

they induce being pleasure and pain. These are called general as opposed to the special courses, and constitute the physiological basis of the *general sensibility*.

As to distribution, the sensor apparatus is coincident in extent with the body itself. The organs of general sen-

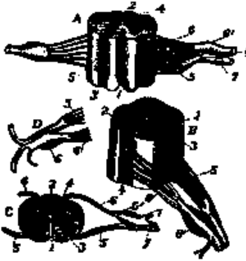

FIG. 2.—The spinal cord and nerve-roots. *A*, a small portion of the cord seen from the ventral side; *B*, the same seen laterally; *C*, a cross-section of the cord; *D*, the two roots of a spinal nerve; 1, anterior (ventral) fissure; 2, posterior (dorsal) fissure; 3, surface groove along the line of attachment of the anterior nerve-roots; 4, line of origin of the posterior roots; 5, anterior root filament of a spinal nerve; 6, posterior root filament; 6', ganglion of the posterior root; 7, 7', the first two divisions of the nerve-trunk after its formation by the union of the two roots.

sibility are distributed throughout in the form of very fine fibrils; these fibrils being gathered into bundles and these again into larger bundles or nerves as they approach the central course, the spinal cord. With these are the nerves of touch and muscular movement, also of general distribution, the whole being consolidated into two columns which form part of the white matter of the spinal cord. The posterior or dorsal portion of the cord (the portion farther *back*—*up* in animals) is called the sensor portion (pos-

tero-median columns). After gathering up the representative fibers from all the successive nerves of sense which run into the spinal cord, these tracts terminate in the upper enlargement of the cord (medulla); but further pathways lead up to the highest center, the cortex of the brain—and this is the essential point. For the location of these tracts in the cord, see Fig. 3.

Another tract (the cerebellar) is also supposed to carry incoming impulses upward; it arises from cells distributed along the cord and passes continuously to the cerebellum (little brain). As the cerebellum is also in direct connection with the hemispheres, another upward path is thus established. Foster further supposes that incoming impulses may travel by the gray matter of the cord (see below), or by portions of the gray matter with the longitudinal fibers which connect different segments of the cord together.[1]

Upon the endings of the sensor courses recent research has thrown some light. Peripherally, the sensor fibers end in the tree-like ramifications spoken of above. Going inward, such a fiber reaches first a cell in the spinal ganglion, then penetrates the posterior horn of the cord, and terminates in the gray matter of the cord in the "tree structure" again. Here its influence seems to be transmitted to a sensory cell from which a fiber proceeds up the posterior column to the cerebral cortex as described, ending as before in the "tree structure." See Fig. 4.

The arrangement of the apparatus of the special senses is more special, indicating to a degree the order of development of their several functions. The muscular sense extends to all the muscles; touch and temperature to the periphery, the end-organs residing largely in the skin.[2]

[1] *Text-book of Physiology*, 5th ed., pt. iii, p. 1104. Cf. his whole discussion, *ibid.* § 6.

[2] And in the mucous membrane of the mouth and pharynx, which constitutes with the skin the derivatives of the epiblastic layer of the embryo.

The other special senses, sight, hearing, taste, and smell, have each a particular locality; but they are grouped together, and their nerves, by reason of their special and closer connection with the central nervous masses in the skull, are called cranial nerves.

The Reacting or Motor Apparatus The analogy between the receiving and the reacting apparatus is so close

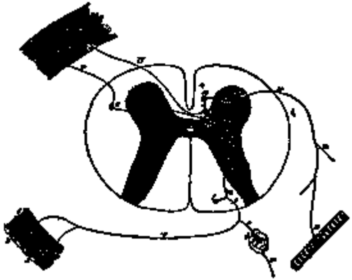

FIG. 4.—Transverse section of spinal cord, showing anterior (H) and posterior horns, sense organ (skin, S), muscle (M), brain cortex (B), and spinal ganglion, (G). Sensory path—1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14. Voluntary motor path—15, 16, 17, 18, 19, 20, 21, 22, 23. Reflex path—1, 2, 3, 4, 5, 6, 7, 8, 9, 20, 21, 22, 23. Note the "tree-structure" nerve-endings. (After Waldeyer.)

that they may be taken up together; more especially as the purest type of reaction, as will appear below, assumes that there is no break of continuity between them. The nature of the reaction itself is a point of function and is reserved; the apparatus is what asks attention now.

In the reaction we find another system of nerves, the *motor courses*, quite indistinguishable from the sensor

courses, except in their localities and their endings. They are also alike among themselves as regards their end-organ, the muscles.[1] They issue directly from the body of the muscles and converge to the spinal cord, of which they constitute roughly the anterior (front) or ventral portion—the so-called pyramidal tracts. The essential facts, again, are the continuity of structure throughout and the universal distribution of the motor courses to the muscular tissue. The distribution, however, does not secure equally ready reaction of all the muscles; indeed, some of the muscles are either entirely outside the range of voluntary control, or are brought within only by much exertion.

As to their endings the motor courses exhibit more simplicity. They arise directly from cells in the cortex, and have their first ending in the "tree-structure" in the anterior horns of the spinal gray matter. There the "influence" is taken up by the spinal *motor* cell, and from it is transmitted direct to the muscle by means of a nerve with the "tree-structure" ending. See Fig. 4.

At the upper end of the spinal cord there is an enlargement, the *medulla oblongata*, in which occurs a rearrangement of all the courses and their distribution to the various masses of the brain. Above the medulla again we find other white fibrous bodies—which need not be enumerated—serving two evident purposes; *i. e.*, they gather together fibers which minister to the same function, and distribute these fibers to the cellular bodies at which such functions have their brain-seat. In these higher white masses, motor and sensor courses are inextricably interwoven; and in only a few cases has research succeeded in establishing pathways up or down. Without giving details, we may say that the following points are quite definite:

1. *Sensor tracts* pass from all parts of the periphery of the body up through the dorsal column of the spinal cord,

[1] The secretive and vaso-motor connections are, for our present purpose, neglected.

cross (decussate) in part in the medulla, and reach the surface of the opposite hemisphere of the brain (largely the rear and nether portion).

2. *Motor tracts* pass from all parts of the periphery up through the ventral column of the spinal cord, cross in part

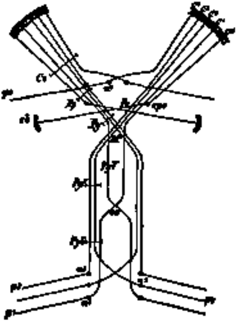

FIG. 5.—Scheme of pyramidal tracts. p^1, p^2, p^3, Periphery of body; n^1, n^2, n^3, spinal nuclei of origin; *PyS*, lateral pyramidal tract; *PyV*, anterior pyramidal tract; *aa*, anterior commissure of spinal cord; *DP*, decussation of pyramids; *Py*, pyramids; *Pe*, pes pedunculi cerebri; *Ci*, internal capsule; *Po*, pons; *nm*, nuclei pontis; *ce*, cerebellum; p^4, periphery supplied by cranial nerves; n^4, nucleus of origin of a cranial nerve; C^1 to C^4, cortex cerebri. (Obersteiner.)

in the medulla, and reach the opposite hemisphere in the motor zone (area on both sides the fissure of Rolando, including the paracentral lobule[1]). These courses are called the *pyramidal tracts*, from the pyramid form in

[1] See below, § 4, 1, and Frontispiece.

which they are bunched on the ventral side of the medulla. See Figs. 5 and 6.

3. *Association tracts* develop, in the course of the life of the individual, to connect all parts of the cortex of the

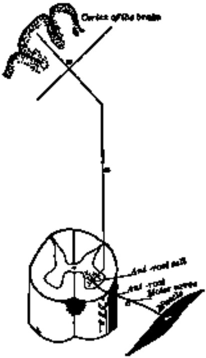

FIG. 6.—Diagram of innervation of a muscle. (After Edinger, Am. Ed.)

brain with one another. They are almost, if not quite, absent at birth. In the words of Edinger: "They extend everywhere from convolution to convolution, connecting parts which lie near each other as well as those which are widely separated. They are developed when two different regions of the cortex are associated in a common action."[1] See Fig. 7.

[1] *Structure of the Central Nervous System*, p. 66.

Under the same head may be included also the fibers which connect the two hemispheres with each other,

FIG 7.—Diagrammatic representation of a part of the association fibers of one hemisphere (After Edinger, *Am. Ed.*)

making of them a single organ in relation to the lower parts of the system. Such connections are found in two great bundles called the *corpus callosum*, which is the floor

FIG 8.—Frontal section of the course of the corpus callosum and the anterior commissure. (After Edinger, *Am. Ed.*)

of the great longitudinal fissure which separates the hemispheres from above; and in the *anterior commissure* below. Both are shown in the accompanying figure (8).

The Registering Apparatus. Under this term we include the more or less complex chain of cellular elements which constitutes the center receiving and reacting. The word registering emphasizes again the integration or development side of the nerve-process. In its most general or schematic outline, the system is made up of two similar nerve-courses brought into organic connection at their upper end by this cellular series. It may be repre-

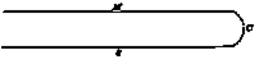

Fig. 9

sented to the eye in the following simple way: M being the *motor course*, S the *sensor course*, and C the *central elements*: the whole constitutes the elementary *nervous arc* (Fig. 9).

Our knowledge of the central elements is exceedingly vague, both as regards structure and function. As to structure, the most exact thing that we can say is that the center is cellular and probably in all cases complex. Its complexity is indeed so striking and elaborate that it is this feature that tends to obscure all others and render research fruitless. A general distinction is made by physiologists between the simple arc and the complex mass of many arcs with their accompanying highly integrated center; but the simple arc is a pure abstraction. Indeed its very conception is dependent upon the results of an analysis of the centers which has never been made. In reality it is probable that the simplest nerve-reaction of which we have any knowledge involves a cellular mass and a number of

alternative motor and sensor tracts. Such a relatively simple system is found in the ascidians, which have only a single ganglion with sensor and motor filaments. See Fig. 10.

In distribution, the central masses again illustrate the hierarchical arrangement due to development. The simplest of such arcs are at the points of union of nerve-courses, points where the motor and the sensor find an interchange of energies, or a distribution so uninvolved as to follow from the nature of the nervous integration it represents, without appeal to a higher and more complex center. Such comparatively simple points are called *ganglia*. For example, the nerves which enter the spinal cord on either side at intervals throughout its whole extent divide a short distance from the cord, and send branches called *motor and sensory roots*, respectively, into the cord. Just above the point of division, on the sensory root, we find a *swelling or bump*, a *ganglion*. The ganglion, it is thought, represents a junction, to use a railroad figure, for the transfer of passengers and the interchange of telegraphic messages.[1] See Fig. 3 above.

FIG. 10.—Nervous system of an Ascidian (Carpenter). *a*, the mouth; *b*, the vent; *c*, the ganglion; *d*, muscular sac.

The spinal cord is made up of a series of segments, together forming a column in the center of which is a continuous mass of gray (cellular) matter. This gray column gives off the *spinal nerves* from its two *posterior* and two *anterior horns* (see Fig. 3); the nerves thus given off, right and left at the same level, meet just below the enlargement or ganglion outside the cord. Above the spinal cord the gray matter is enormously increased, as we should expect

[1] On the functions of the ganglia and centers generally, see below, p. [illegible] f.

from the increase in the fibrous pathways already described. Thus a number of bodies are formed in three connected systems:[1] first, the most *central* gray matter, serving to connect the spinal column with the higher centers, and giving the cells from which arise the cranial nerves; second, the *tegmental* system, including all the masses which lie in the interior of the brain (the most important being the *striate bodies* and the *optic thalami*); and third, the surface masses, the *cerebrum*, which has its gray matter arranged in layers, giving the *cortex* or rind, and the *cerebellum* or little brain, a similar mass behind and beneath the cerebrum with a similar cortex of its own. For present purposes the essential points again to be noted in this connection are, first, what we have called the hierarchical character of the series, the unbroken advance in structural complexity; and second, the continuity of connection and influence through it all.

§ 2. Functions of the Nervous System.

Fundamental Properties of Nervous Tissue. Experimental research upon living nerve-tissue has issued in a conception of protoplasm which includes two functional elements. At the first glance, nerve substance exhibits the property called in general scientific nomenclature *irritability*. This property is by no means confined to developed nerve-elements; it is exhibited by all living animal tissue, by forms of organism in which a nervous system is entirely wanting. In some forms of vegetable life, as the sensitive plant, the same property is presented. In the case of nervous irritability, however, whenever the substance assumes the complexity of a system, we are led to view it under two distinct functional rubrics. Recalling a former division, we find the receiving and the reacting

[1] Following Foster, *Text-book of Physiology*, pt. III, pp. 977-998. For details and diagrams see any of the Physiologies, Ladd's small *Outlines of Physiological Psychology* is convenient for reference.

apparatus to be appropriate to the same function, that of propagation, transmission, or conduction; and the central arc, the registering apparatus, suggests a function of integration. Assuming the results of later exposition, these two functions may be called, respectively, *Neurility* and *Sentience*.

Let us consider, for example, the central arc A, of Fig. 9, above, to be the center or nucleus of a protoplasmic mass, and the two lines M and S to be two radii from the center to the outer surface. If, then, the mass be stimulated at the outer end of S, and this be followed by the withdrawal of the point stimulated, we have a phenomenon of irritability. But we may suppose S to be a line of conduction of the excitation to A, and M the line of reverse conduction or reaction which results in the contraction; both of these fall under the conception of *Neurility*. The process by which they are held together at the exchange-bureau A, so to speak, is *Sentience*. This rough conception may be made more distinct as the two processes are taken up singly.

1. Neurility. Under the head of neurility we are introduced to a class of phenomena which have striking analogies in physical science. The conception or phenomenon of *conduction* is familiar in what we know of light, sound, and heat propagation; but the special analogy which at once suggests itself is electric conduction along a metallic wire. Setting aside as a matter of speculation the hypothesis that neural force is identical with electricity, we may still find in the analogy much help to a clear conception of nervous conduction.

Indeed the theory of nervous action most current among authorities—as well as in the popular mind—finds its general exposition in terms of the analogy with electric action. On this theory, the nerve-courses are simply and only conductive tracts, as the electric wire in a telegraph system; the centers, on the contrary, are the generators of

"nervous force." At the center we have, therefore, a storage-battery from which force is drawn off along the motor courses upon the occasion of the arrival of a stimulus from the sensor course. The centers, on this theory, are the essential nervous agents, or producers, and the courses are brought into operation only as they are charged from the central battery or pile. Neurility, therefore, is simply the molecular state which constitutes a course a good nervous conductor.

This theory is objected to both on theoretical grounds and from experiment. It makes the distinction between courses and centers too absolute and mechanical. According to it, any distinct dynamic property is taken from the nerve-tracts; while experiments show that the elementary portions of both sensor and motor nerves have a life and function *of their own*. The eye when removed from its socket, thus losing all connection with a center or ganglion, still shows sensitiveness to light, and has a motor reaction in the contraction or expansion of the iris. Pflüger maintains that there is an increase in intensity in the nervous disturbance as it traverses the motor nerve, and Richet thinks a similar increase in the sensor nerves probable. The ordinary phenomenon called knee-jerk is thought by some to take place without appeal to a nervous center.

Accordingly, another theory is advanced which seems more philosophical to the present writer, so far as he ventures to have an opinion on a matter so purely physiological. This second conception of the nervous system makes it a living organism instinct with nervous force or neural properties throughout. This system is in a state of unstable equilibrium and constant change, due to stimuli through sense-organs and to spontaneous central discharge. Disturbances tend to equalize themselves everywhere in the system by a species of centrifugal and centripetal tension, which, through its greater or less effectiveness in this direction or that, upon this course or that, results in conduction

or neurility. Differentiation, therefore, in the system, is primarily structural differentiation, due to the adaptation of the life-process to changing conditions in the environment.

The "dynamic" conception, as the latter may be called, is supported by a class of facts which show a ready and facile influence throughout the system, difficult to account for if the parts between which the transfer occurs are functionally distinct; such general transfer affords the so-called law of *diffusion*. For example, a simple sensory stimulus may, when intense, or when the system is excited from disease, lead to general irritation and diffusive discharge. On the other hand, a reflex having its center in a particular spinal ganglion may be partially stopped by a sensory excitation from another part of the body. Cases of association between sounds and colors,[1] and phenomena of contrast[2] generally, show such dynamic connections between disparate sense-regions. Urbantschitsch found that the perception of color was improved when a tuning-fork was made to vibrate near the ear.

However it may be explained, nervous conduction is of fundamental importance for the theory of sensibility. And for practical purposes the wave or current theory serves, as in electricity, all ordinary requirements. The nervous wave, therefore, is called *centripetal* or *afferent* when moving toward the center, and *centrifugal* or *efferent* when moving toward the periphery. The rate of transmission differs somewhat in the two directions, being about 120 feet per second for sensor and 110 feet for motor impulses. Transmission through the spinal cord takes place considerably more slowly.

2. **Sentience.** From the interpretation of results, and from physiological analogies, some general statements may be made concerning the processes at the centers, and these general statements are valuable for psychology; but they

[1] See below. [2] Below, chap. viii, § 2.

do not pretend to throw any light upon the genesis or nature of nervous force.

a. Integration. Of these general statements, the first concerns what has already been called the *integrating function* of nerve centers. By this is meant the building up of a center to greater complexity of structure through new stimulations. It takes place by reason of the extreme plasticity of the nervous elements in taking on arrangements suited to more habitual and, at the same time, more complex reactions. The center becomes the theater of multiple and conflicting stimulations; its reaction is the outcome of a warfare of interests, and the pathway of discharge is a line of conduction most favorable to future similar outbursts. A center gains by such complex activities in two ways: first, its habitual reactions become a rock-bed or layer of elements, so to speak, of fixed function issuing in established paths of least resistance; and second, the center grows, gaining new and more mobile elements, and responding by more complex and difficult movements. For example, the center for the movements of the hands is educated, from the early painful lessons of the baby's finger movements to the delicate and rapid touch of the skillful musician. Not only has the center become fixed and automatic for movements at first painfully learned, but it has become educated by learning, so that it acquires new combinations more easily. This twofold growth becomes the basis of the division of the sentient apparatus into centers and ganglia. The "rock-bed" elements, so-called, fall into fixed ganglionic connections, and the new and free cells take up the higher function, only in their turn to become "fixed" by habit and to give place to yet other and more complex combinations. This integrating process is what gives the hierarchical order to the system, and throws its law of development into fine relief. Integration, therefore, represents a structural change in the direction both of simplicity and of complexity: of sim-

plicity, because it gives ease and rapidity to habitual movements; of complexity, because it brings into play new elements which must be assimilated to the unity of the center.

b. Retention. The conception of integration necessarily includes that of the permanence of the modification on which it depends. If reactions are integrated in such a way as to secure the upbuilding of the system and its more perfect adaptation, then we must suppose that each reaction works a minute structural change in the organism. So much is included in the conception of integration. And from the physiological side this would seem to be sufficient. Retention, as a physiological principle, may, therefore, be called growth in functional complexity; while the term integration refers rather to growth in structural complexity.

Accordingly, the conception of nervous retention runs somewhat like this: *Nervous retention is a state of dynamic tension or tendency due to former nervous discharges in the same direction;* the two essential points, again, being the dynamic or tension aspect of nerve-action in general, and the particularization of this tension along a given path determined by previous like discharges.

c. Selection. A third fact of sentience may be called *selection.* It denotes the undoubted property of the living nervous system of reacting within limits of greater or less adaptation. It shows *preference* for certain stimuli above others, if the word preference can be shorn of all its reference to conscious choice. A system will react on a stimulus at one time which it will refuse under other circumstances; or it will distinguish between stimuli exactly alike, as far as human sensibility for differences can determine. The brainless carp will distinguish food with some degree of precision, and experiments by Pflüger and Goltz on brainless frogs show that they adapt their muscular reactions to varied positions of the limbs which could not

have been experienced before in the life of the creature. Schrader has also reported many similar cases of apparent preference and choice in brainless pigeons.

Such instances seem to show a selective function in nerve-reactions of the purest type, *i. e.*, those simply ganglionic, where the effects of consciousness are either quite wanting or reduced to a minimum in intensity. The explanation is perhaps to be found in the peculiar delicacy of the receiving apparatus. To say that a brainless animal selects when we are unable to point out differences, is only to say that more debased currency will pass for gold with us than with it. Instead of selecting between two stimuli, therefore, it has had only one, and has responded to it; the other being mistakenly considered by us as fitted to excite it. Does the nervous system select from a multitude of similar touches? The magnet selects from a multitude of similar filings; and the explanation seems to be the same. Neither the touches nor the filings are similar, after all.

Another explanation of selection must be mentioned, however, both because it is held and because it affords a philosophical and quite plausible hypothesis; it is possible that our subsequent discussions will bring us into accord with it. It holds that sentience involves *consciousness*, that nervous action is always conscious (not self-conscious) action, and that a fundamental mark of consciousness is preferential selection or choice. On this theory, therefore, all such cases are instances of real selection, due to the presence of consciousness. The explanation given to nervous selection has psychological significance, since, according as it is explained, it may or may not give us data for our theory of voluntary choice.

Law of Nervous Dynamogenesis. Sentience, in view of what has been said, is a general word for the rise and distribution of nervous force. The receiving and reacting functions are both essential, the one necessarily giving rise to the other; there is no incoming nervous process, there-

fore, that does not tend to liberate energy on the outgoing courses. *Every stimulus has a dynamogenic or motor force*—may accordingly pass as a statement of the law in its individual bearing, the only bearing which is available as having a psychological analogy.

§ 3. KINDS OF NERVOUS REACTION.

The twofold growth of the nervous system spoken of under integration gives us data for a distinction among different reactions. Integration involves, on one side, a downward or "ganglionic" growth, represented in function by the more unconscious and unintended reactions of the muscular system; and, on the other side, an upward or "central" growth, represented by the more difficult muscular performances, in which attention and effort are called out. These two laws of growth act together, and in the result, in our motor experience, we find every degree of nervous facility or the contrary. Three stages of such growth, from down up, so to speak, are usually distinguished.

1. **Automatic Reaction.**—By the *automatic* in nerve-function is meant the self acting, *i. e.*, those reactions which find their stimulus in the living conditions of the physical organism itself. Certain organic processes are necessary to the life of the individual and the race—circulation, respiration, digestion, etc. The dependence of these essential functions upon external stimuli of time and place would give an accidental and varied character to these reactions which would subserve death rather than life. Accordingly, the automatic centers represent the most consolidated and fixed portions of the nervous system, at the same time they are complex and elaborate. These functions may or may not be conscious, their most healthful activity being generally most free from conscious oversight. With very rare exceptions, also, they cannot be modified by the will or brought under voluntary control.

2. Reflex Reactions. A nervous circuit is *reflex* when its motor reaction upon a particular kind of stimulus is single, definite, constant, and does not involve volition in its execution. In more general terms, a reaction is reflex whenever we are certain beforehand that it will take the form of a particular well-defined muscular movement, and will do its work without any interference or mandate from ourselves. We are disposed to stand apart and attribute the reaction to the organism or to the external stimulus. For example, if a ball suddenly approach my eye, *it* closes, or if it strike sharply upon my knee, *my foot* flies up; we do not say *I* close my eye or raise my foot. Or we go further out still and say the man who threw the ball *made* my eye close or my foot fly up—so thoroughly do we distinguish this class of reactions in consciousness from those which we attribute to our own agency.

In its physiological character, this kind of reaction represents a less organized and consolidated system of elements than the automatic. A reflex reaction is generally conscious in its operation, and always so in its completed results. Its center, also, is not cut off functionally from the higher centers of the brain, which exercise a controlling influence. Yet we know that this connection is not an essential one to the reaction itself, since after the removal of the cerebrum and with it all active consciousness (certainly; perhaps all consciousness), the reaction still takes place. Each of the segments of the spinal cord has its own reactions apart from its brain-connection. Indeed, reflex reactions are most perfect and pure when consciousness in the form of attention is not directed to the movements. These facts tend to throw reflexes rather on the side of the "downward" growth spoken of, and assimilate them to automatic reactions. The phenomena presented by the reactions of a brainless frog illustrate pure reflexes very clearly.

The downward growth appears from the fact that many

of our reflexes are acquired from habit and repetition. Motor processes at first difficult and simple are welded together in complex masses, and the whole becomes spontaneous and reflex. The case is cited of a musician who was seized with an epileptic attack in the midst of an orchestral performance, and continued to play the measure quite correctly while in a state of apparently complete unconsciousness. This is only an exaggerated case of our common experience in walking, writing, etc. Just as a number of single experiences of movement become merged in a single idea of the whole, and the impulse to begin the combination is sufficient to secure the performance of all the details, so single nervous reactions become integrated in a compound reflex.

This consideration leads to a further distinction between more or less organized reflexes; namely, between what are called *secondary-automatic* reactions and reflexes proper. In the case of our movements in walking, for example, the successive reactions are not sufficiently organized to belong properly to a single stimulus—say the original idea of our destination, or the sensation of our first footfall upon the pavement; but the steps in succession are probably excited by the successive afferent impressions of the steps accomplished. Each step stimulates the next, etc. That there is no voluntary stimulation after the first is seen in cases of reverie or absent-mindedness, when we go along accustomed paths and find ourselves where we least intended to "bring up." The distinction, therefore, is merely one in degree of integration. If the centers are sufficiently organized "downward" to carry out the entire chain of movements when once begun, we have a pure reflex; if new sensory stimulation is necessary at each stage in the series, the reaction is secondary-automatic.

3. Voluntary Reaction. A third great class of nervous reactions is called *voluntary*. By voluntary reactions are meant such motor effects as follow upon the conscious will

to move. They cover the whole class of intended movements and those brought about by greater or less effort. Voluntary movements show variation in several distinct particulars; such as strength, continuance, rapidity, and direction.

The voluntary reaction undoubtedly represents the highest stage of development of nerve-tissue as respects complexity, or the lowest stage as respects consolidation and fixedness. It is the polar opposite of the purely automatic function. The nervous elements are in a state of extreme mobility and instability. The connections through its mass are infinite in number and complexity, and numberless alternative courses are accordingly open to the motor outburst of a sense-stimulation. Considering the state of the cerebral center dynamically, we may say that its potential energy is constantly seeking discharge, and that this discharge in one course rather than another—the course pictured and designed in consciousness—represents the line of tension which is chosen.

The last expression, though psychological, is necessary to express the physiological fact which distinguishes such reactions. The stimulus is in all voluntary reactions a central one, and a conscious pictured one; this much at least. If we admit that no discharge from the centers can take place without a previous liberation of tension, then we may divide such liberations from tension into two classes: that which is brought about by an incoming current, and that which is brought about by an earlier cerebral discharge. The former is a reflex reaction, the latter *may be* a voluntary reaction. One at least of the conditions of voluntary action is fulfilled, the physiological condition. Whether this is sufficient in all cases, or in any case, to account for the action, it is our subsequent task to determine.

4. Negative Reaction or Inhibition. Under the name of *inhibition*, or arrest, a class of phenomena is included

which are, as far as our knowledge goes, peculiar to nervous activities. Every positive reaction is accompanied by a reverse wave, an arrest, so to speak, of its full effects. It is analogous to a negative force acting to counteract and neutralize the outgoing discharge. It seems to take place in the center. The effective force of a reaction, therefore, is always less by the amount of nervous arrest. This neutralising factor has been measured in certain conditions of nerve-reaction.

The kind of reaction showing least arrest is the reflex; and, in general, the more consolidated a nerve-track or center, the less exhibition do we discover of the reverse wave. On the other hand, inhibition is at its maximum in reactions which involve centers of most complex activity. The phenomena of voluntary control—inhibition by the will—are in evidence here, however we may construe the will. For it should be remembered that we must find a mechanical basis for muscular control, even though we advocate a directive and selective function of will.

Hence we may say that inhibition is a concomitant of instability and complexity of nervous tissue; and it belongs on the side of the "upward" growth of the system.

This general view is sustained by the fact now established that each segmental reflex in the spinal cord is subject to inhibition from the higher segments, and in turn inhibits those lower down. The reflexes of a frog's legs immersed in dilute acid are more rapid and violent after the hemispheres have been removed—showing the normal inhibitive function of the cortex; and the reflexes of a lizard's tail have been shown to increase in vigor as the segments of the spinal cord are successively removed. The same lack of inhibition appears in the greater automatism, suggestibility, and wayward impulsiveness of certain forms of insanity. The same truth is made plain from the fact that lesions of the motor zone of the cortex in man produce greater motor disturbance than in animals, and

greater in the dog than in the rabbit; the inference being that the subcortical centers are more independent, less inhibited, as we go lower down in the scale of animal organization.

§ 4. Corollaries: So-called "Principles of Nervous Action."

The foregoing discussion has brought us to a position from which to estimate the current "principles of nervous action." That they are corollaries deducible from the more particular truths already cited is in itself proof of the truth of the conception sketched in the foregoing pages. These "principles" may be spoken of in their logical order.

I. **Principle of Specialization of Function.** According to this principle, different regions of the nervous system are concerned with different and exclusive functions. Most important consequences flow from this principle in the sphere of brain physiology and anatomy. And in the local divisions of the cerebral surface we find facts highly important to our own science.

Facts of Specialization. A general fact or two may be mentioned in view of subsequent points of discussion. In the two halves or hemispheres of the brain we are led to recognize a twofold or duplicate organ, analogous to the doubleness of the eyes while performing together a single function. In regard to the function of the brain as a whole, we may say that in the main it is performed equally well by either hemisphere alone. If one hemisphere be entirely removed or destroyed, there is no perceptible impairment of the mind, at least in its great apperceptive activities. The hemispheres are moreover capable of separate activities at the same time; the movements of organs on the right side of the body which are governed by the motor area in the left hemisphere, may be different from simultaneous movements on the left side governed by the motor area in

the right hemisphere. Again, there are certain functions which are presided over by one of the hemispheres exclusively, the other having no part in them: the motor speech-center is in the left hemisphere for right-handed persons, and it is probable that there is a corresponding functional development for the delicate movements of one hand only, as in writing, etc. Accordingly, instead of considering the brain as two duplicate organs, either of which might be educated to perform all the cerebral offices, we have to consider it as a double organ whose functions are partly separate and partly conjoint. That is, the facts point to the conclusion that (*a*) there is a class of functions over which the hemispheres have conjoint dominion: functions which they may perform together and which either may perform alone, and functions which they must perform together and cannot perform alone; and (*b*) there are functions which are peculiar to each alone: which one must perform alone, and in which the other has no share.

The great divisions of function may be stated in general terms under three heads in accordance with the facts now presented.

1. Purely reflex functions are presided over by the spinal cord and lower centers

2. The automatic functions proceed out from the "central" and "tegmental" systems of centers.

3. Sensation and voluntary movement have their seat in man in the cortex of the brain.

If 1 and 2 be considered together as giving only one degree of complexity, and 3 be added as giving another degree, we may show their relation by Fig. 11, in which the circuit *s*, *c*, *mt*, represents all reactions not voluntary, and *s*, *c*, *sp*, *mp*, *c*, *mt*, those which are voluntary.

For convenience in later discussion, the higher reaction may be taken alone and simplified, as in Fig. 12, called the "motor square"; in which we have the three elements as before (*sp*, *mp*, *mt*) with an added element (*mc*), *i. e.*,

the consciousness of movement accomplished (represented by the dotted line *mc* in Fig. 11), the lower centers (*c*) being here left out of account.

The degree to which the cortex serves the purposes of mind above the bare reception of present stimuli and mechanical reaction upon them, is seen in the behavior of animals deprived of the cortex. Frogs and pigeons have been fully tested in view of this question. It is found, in

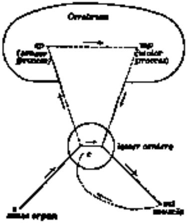

FIG. 11

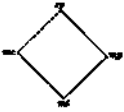

FIG. 12.

s, c, mt = Reflex circuit (1 and 2 of text)
s, c, sp, mp, c, mt = Voluntary circuit (3 of text)

brief, that the life and reactions of the creature are unimpaired as far as the immediate environment is concerned: it lives, breathes, flies, sees, eats, carries out reactions of response to direct stimulation. But it fails to respond to remote stimuli; the reactions are for the most part uninfluenced either by the past or the future. The creature lacks spontaneity. Memory has disappeared; so have generalization and purpose. The creature has *sensations*, but not *perceptions*, as far as a line can be drawn between these states. It fails to *recognize* and it fails to *attend*. It

is plain, then, that such a hemisphereless creature lacks largely the co-ordinating, retaining, relating, or, as it is called below, the apperceiving, function. It illustrates what, on Hume's theory of knowledge, ought to be the condition of us all. The terms *psychic*-blindness, *psychic*-deafness, etc., are given to this condition, in which there is no *physical* blindness, etc., but in which sensations have lost their mental *meaning*.

As for particular reactions, however, the greatest difference is found in different animals. In dogs and birds many functions are performed by the lower centers which are presided over by the hemispheres exclusively in monkeys and in man. This illustrates what has been observed above, *i. e.*, that reactions at one time reasonable and intelligent may become nervous and mechanical: and this consideration, based upon extended experimental proof, leads us to recognize, below, the great elasticity of the system as regards specialization. When these maimed animals are kept alive, their condition improves, and they begin to get something of their intelligence back again.

Cerebral Localization.[1] The question as to whether there are local areas in the cortex or gray matter of the brain which are especially active in the exercise of the sense and motor activities, is of great importance for general psychology. Experiments have been very conflicting in their results, but it is now generally admitted that there are a limited number of well ascertained areas. The motor functions are grouped around the fissure of Rolando, extending roughly from the vertex of the skull downward and forward to a line which passes slightly in front of the orifice of the ear. The centers for the leg, arm, and face are in the order named, proceeding downward. The special muscular groups involved in the finer movements of these organs are distributed on both sides of the Rolandic fissure. Movements of speech have their center for right-handed persons in the third frontal gyre of the left hemisphere.

[1] Cf. figures opposite the title-page.

The sensory area comprehends the region lying back of and beneath the motor zone; the fissure of Sylvius being a rough horizontal boundary between the motor and sensory areas. Of the special senses, sight is located in the occipital lobe, including the so-called angular gyre at the upper end of the Sylvian fissure. The centers for hearing, taste, and smell lie, less exactly, in the temporo-sphenoidal lobe, the horizontal area below the fissure of Sylvius.

In man the destruction of the frontal lobes seems to bring about a higher kind of "psychic blindness": a loss of voluntary attention, co-ordination, and thought. The hypothesis is widely current that these lobes are the final center of convergence for the connections between the sensory and motor centers of the brain. The loss of connection between this seat and any other area cuts the latter with its store of memories off from its full rôle in the mental life. For example, speech may be impaired by the loss of any one of three functions located in different areas, *i. e.*, word-seeing, word-hearing, and word-uttering.

II. **Principle of Indifference of Function.** The principle of indifference includes the class of facts which show that the nerve-courses are not the agents of different or specific forces, but parts of a common system and agents of a common life. As a matter of fact, we find that different courses can be made to perform each other's function. If a piece of sensor nerve be joined to a cut end of a motor nerve and grow in place, it will conduct the motor impulse continuously with the motor piece. The contrary is also true. The range of such experiments is very limited, since it is impossible to exchange the end-connections of nerves either centrally or peripherally; but the facts at hand establish conclusively the principle of indifference as regards the sensor and motor nerve-tracts. In its application to the centers the same principle has a different name, since it takes a somewhat different form of manifestation, *i. e.*, the principle of *substitution.*

III. **Principle of Substitution.** The question here is this: Can the nerve-centers be made to take up each other's function? Researches in cerebral localization, chiefly upon animals, tend to show that such a substitution of function is possible, at least to a limited degree. The removal of a cortical center, which occasions loss of one of the special senses, say sight, or the loss of control over a certain muscular area, seems to be made good by the assumption of the deranged function by a contiguous, or, at least, a connected center. At any rate the animal recovers, if kept alive a sufficiently long period. The word "seems" is used advisedly, for it is still uncertain whether the loss of such a function is due to the destruction of the entire apparatus normally reacting to this function, or to its partial loss, the remaining elements being temporarily inhibited by so-called "physiological shock," or, in the case of electrical stimulation, by diffusion of the current. The latter is known to be the case in many of the experiments on brain-tissue, especially when the surgical method is employed without the extremest care. This latter view is also supported by the remarkable fact that in the monkey and man these substitutions are exceedingly rare; a result we would expect on the shock theory, considering the higher degree of delicacy and differentiation attained by the system in these higher organisms. Yet in the case of rabbits and dogs, such substitution of function, notably of the sight-function, is probably established on a firm basis.

IV. **Principle of Specific Connection.** The limits which the growth of the organism sets to the substitution of functions find their expression in what is called "specific connection" through the system. By this principle is meant, in general, two things: First, that nerve-courses are specific only according as they have certain well-defined connections at center or periphery. These connections keep the courses to an invariable function. The

optic nerve has a specific connection with the retina and with the optic center in the brain, the auditory nerve with the ear and the center for hearing; and so on. In this case, it is the end-organ or the center which is specific, not the nerve-tract. And second, it means that nerve-centers are specific according as their connections necessitate their reacting to a specific stimulus. The optic center has specific connections with the retina through the optic nerve; the center for sounds with the ear, through the auditory nerve, and so on. Now there are as many of these specific connections as there are kinds of stimuli issuing in motor reactions. Consequently, the only specific things after all are the stimulus and the movement.

V. **Principle of Summation of Stimuli.** If the stimulus more than overcomes the arrest in a given case, there is left over, so to speak, a surplus of positive energy, or positive "molecular work." This positive molecular work is work of reaction, or exhaustion of the system; negative work being inhibitory or conserving. This surplus represents, therefore, a disposition favorable to a second stimulus of the same kind. We have, therefore, here a certain summation of stimuli in cases of recurring excitations of the same character. After moving the thumbs in a certain rotatory manner a certain number of times, we say they are "ready" for that movement; they have taken on a disposition to react to the same stimulus again. This union of former stimuli with later in the nervous center, giving an easier and smoother reaction, is the phenomenon of *summation.* Its most remarkable exhibition is seen in cases in which the earlier stimulus is not sufficient to overcome the arrest or inertia of the center, and does not give a reaction at all; so a weak electrical stimulus: even here we find the center so "prepared" by this insufficient stimulus that it responds when that identical stimulus is repeated a sufficient number of times. The most favorable interval between such shocks is about .001 second. The successive

blows of a toothed wheel upon a metallic tongue give an audible sound when a single such blow is inaudible.

The different senses vary very much in the interval of time between successive stimulations necessary to prevent summation or fusion; the finger discriminates 1000 touches per second; an interval of .005 second is sufficient to keep sharp sounds apart; electric shocks on the forehead fuse if more than 60 occur per second. With sensations of sight, the fusion occurs across a greater interval, say .05 second, by reason of the persistence of optical after-images.

§ 5. Final Statement of Nervous Function.

We are now in a position to give the general conception of nervous function in broadest statement; a statement the accepted terms of which have great psychological significance. All the phenomena of consolidation or "downward growth," on the one hand, illustrate what is known as the law *of Habit;* all the phenomena of specialization, or "upward growth," illustrate the law of *Accommodation.*

Law of Habit. Physiologically, habit means readiness for function, produced by previous exercise of the function. Anatomically, it means the arrangement of elements more suitably for a function, in consequence of former modifications of arrangement through that function. Psychologically, it means loss of oversight, diffusion of attention, subsiding consciousness.

Law of Accommodation. Physiologically and anatomically, accommodation means the breaking up of a habit, the widening of the organic for the reception or accommodation of a new condition. Psychologically, it means reviving consciousness, concentration of attention, voluntary control—the mental state which has its most general expression in what we know as *Interest.*[1] In habit and interest we find the psychological poles corresponding to the lowest and the highest in the activities of the nervous system.

[1] See the discussion of "Interest" below, chap. xii. § 1.

CHAPTER IV.

CLASSIFICATION AND DIVISION.[1]

§ 1. Three Great Classes.

Besides their common characteristic, consciousness, mental facts have special characteristics which distinguish them from one another and by which they may be divided into great classes. The necessity of this classification is seen in the great multiplicity and variety of these facts. In the beginning of every science, the statement is necessary of the natural knowledge of resemblances and differences, which we may use as a starting-point for investigation. In this classification two great dangers are to be avoided. First, many psychologists, neglecting real resemblances, have made too many divisions or faculties, in a measure dividing the mind into independent principalities and losing sight of the unity of nature which underlies all phenomena of mind. Again, others go to the other extreme in excessive opposition to the "faculty theory," especially in recent years, and fail to recognise essential differences in mental states.

In the main, however, it is agreed that there are three great classes of facts in the mental life, however strongly the attempt to reduce them further may be urged. These three classes express the result of three distinct *functions* of the mind: *Intellect*, *Feeling*, and *Will*. They may be called: 1st, *Presentative*, or intellectual states; 2d, *Affective*, or states of feeling; and 3d, *Volitional*, or states of will. These great departments of mental fact are shown

[1] *Handbook*, vol. I. chap. iii.

in the very distinct propositions, "I feel somehow," "I know something," "I do something."[1]

The grounds of this classification are found in immediate consciousness, and it can find its justification only in an appeal to direct experience. The presentative states have as their common characteristic their reference to a *thing* or *object*. Knowledge is a function of mind only as there is something to be known, and in the higher forms of its operation its states are taken to re-present or signify objects. In its earliest beginnings also, in sensation, the objective bearing of knowledge, as affording us a reference away from ourselves to a something which is presented to consciousness, is its distinguishing feature.

The affective states, on the contrary, as states of feeling, lack this element of objectivity; that is, they are states in which *consciousness is itself affected* primarily (pain, fear). They may be entirely lacking in the presentative or knowledge element, or the two may be combined in any degree of connection. They extend from the simplest bodily feelings to the highest emotions, and include impulses, temperaments, and personal tendencies of all kinds.

In strong contrast to these well-marked divisions the third class, volitional states, stand out in consciousness distinguished by a characteristic foreign to the other two, the sense of *effort* or *exertion*. It takes the forms of mental attention, choice, and resolution.

The other orders of mental facts may or may not exhibit this will-element. I may be passively affected by pain or emotion, or I may be conscious of a free play of presentations with no effort of my own to control or direct them. This last phase, therefore, may be set apart as a third class, and as representing a third function.

[1] Ward, *Encyc. Britannica*, art. "Psychology."

§ 2. Unity of the Three Classes in Consciousness.

With the distinction of the three classes of mental fact and the three functions they represent clearly brought out, it must still be remembered that the latter are merely *functions*. They are not three psychological lives which lie parallel with one another. They are a single life. Their unity in a single principle may be seen under several aspects.

I. *They have unity of end.* They are functions of a common mental organism and minister to its development. The unity of the body is realized in the unity of the functions of the different organs. The end of all is the conservation and development of the whole. So the intellectual functions are one, in their tendency to preserve the independence of the self and accomplish its destiny. "By intelligence we conceive the end of conduct, by sensibility we are excited to produce it, and by will we govern these impulses in the light of reason and assure the victory of the best. Without intelligence, man is blind; without feeling, he is inert; without will, he is a slave."[1]

II. *They are one in their collective activity.* Each seems to depend on the others in an essential way. Attention is necessary to all thought, and feeling is often necessary to direct or is effectual in preventing the direction of the attention. In its reflex activity, attention seems to be a representative or relating function, but it has the fundamental quality of will in its active exercise as mental effort. A volition, as has been said, proceeds upon ideas and appetences to such an extent that one school of psychologists reduce will to the conflict of ideas and another make it a conflict of feelings. Feeling also involves images or ideas, through memory or imagination, or arises from association, and all of these are representa-

[1] Rabier. *loc. cit.*, Compare throughout this section.

tive. And it seems possible, sometimes, to originate the train from which feeling arises by a powerful act of will.

III. *They find their formal unity in consciousness.* The completed view of the mind ends, as it began, with consciousness, as the necessary background and formal unity of the whole. Consciousness bespeaks the unit being, the subject of this threefold activity, and in its healthfulness or derangement, under normal stimulation of this threefold order, the proper balance and end of the whole is accomplished.

§ 3. DIVISION OF THE SUBJECT.

In view of the above classification, the subject-matter of psychology falls into convenient parts for treatment. In addition to the three great classes of facts spoken of, the form or mark which is common to them all, consciousness, must be considered. There are, accordingly, the following four great divisions:

Part I. *General Characteristics of Mind.*
Part II. *Intellect.*
Part III. *Feeling.*
Part IV. *Will.*

PART I.

GENERAL CHARACTERISTICS OF MIND.

CHAPTER V.

CONSCIOUSNESS[1]

In the foregoing chapters the term consciousness has been used without explanation. Familiarity with it in the general significance it bears in ordinary discourse has been assumed. It is necessary, however, at the outset, to inquire more fully into its nature and position in the science.

§ 1. Nature of Consciousness.

Definition. Disregarding less important varieties, we may say that two general views of the nature of consciousness prevail among psychologists. On the one hand, it is held that consciousness is itself a capacity, function, or faculty of mind, an inner sense for the perception of the mind and its states, as sight and hearing are outer senses for the perception of body. This view rests upon the fact of reflection, the developed means of observation of inner states, which has, in common with sense-perception, the relation of subject and object within itself; but not upon the original awareness which we have of our first experiences. This latter bears no analogy whatever to external perception. This doctrine of consciousness makes it not essential, but accidental, to mind, an added thing, which may be wanting, as external senses, memory, imagination, may be wanting; and admits the supposition of unconscious mind.

[1] *Handbook*, vol. i. chap. iv. and vol. ii. chap. ii.

The opposing view is this, that consciousness is the common and necessary form of all mental states; without it mind is not and cannot be. It is the point of division and differentiation between mind and not-mind.

From the empirical point of view we may make the following observations:

1. *Consciousness is not a power or energy of mind.* It does not involve the conscious effort of attention. In a state of reminiscence, of reverie, the states of mind are uncontrolled, and come and go with no let or hindrance from the mind. We are then fully conscious of this play of states, but of no exercise of mental effort accompanying it.

2. *Consciousness is not an organ of the mind,* to be used by the inner subject in perceiving his states. It is not an inner sense, since it accompanies the exercise of all the senses and is necessary to their function. The senses have specific physical bases also, while consciousness depends upon the healthy and normal activity of the sensorium as a whole. Consciousness is, therefore, *the one condition and abiding characteristic of mental states.*[1]

§ 3. AREA OF CONSCIOUSNESS.

The area of consciousness is the sum of the presentations at any time in consciousness, whether they be distinct or vague. Experiments show that twelve to fifteen strokes of a pendulum can be held in consciousness at once without counting or grouping. If they be grouped by fives, as many as forty may be retained. The most favorable interval between them is .2 to .3 second. Consciousness may be likened to the visual field in which objects are scattered, those being most clearly seen which are in the line of direct vision or center of the field, and those which lie near the circumference most indistinct. Between these limits there are all degrees of distinctness. So ideas are distinct or

[1] On the theory of "Unconscious Mind" see my *Handbook of Psychology*, vol. I. chap. iv. § 2.

vague in consciousness according as they are in the line of mental vision, or attention. The idea attended to is most distinct, those connected closely with it in any way less so, and those which are accidentally present and quite unobserved actively, least so. According as they lie in one or other locality of this general distribution, consciousness of them is said to have different degrees or forms.

Degrees of Consciousness. These may be illustrated by an example. As I write, the noise of my pen is almost unnoticed. If continued some time, it is no longer noticed and is said to be *subconscious*. If the pen is a poor one, and scratches more as used, I continue to write, though

1	The Unconscious (physiological).	
2	The Subconscious	Passive.
3	Diffused Consciousness	
4	Active Consciousness or Attention.	Reactive Consciousness Voluntary Consciousness.
5	Apperception	

Fig. 13.—Graphic Representation of Area of Consciousness, after Analogy with Vision

conscious of the disturbing noise, but give it no attention. It is then said to be in a state of *diffused consciousness*. Thus a thousand things around us—the table, chair, books—are present to our minds, but we are passive in regard to them. If now my attention is drawn involuntarily to my pen we have *reactive consciousness*, or *reflex attention;* and if I voluntarily examine the point in order to remedy it, there is an active putting forth of myself mentally; there arises *active consciousness* or *voluntary attention*. The state of things in which the attention is concentrated upon an image is *apperception*. Further, all the lower conditions, in which there is no attention, either voluntary or involuntary, may be designated in common as *passive consciousness*. See Fig. 13.

It is well to note the play of ideas through all these forms of transition, from the dark region of subconsciousness to the brilliant focus of attention. Images pass both ways constantly, acting varyingly upon one another and making up the wonderful kaleidoscope of the inner life.

Apperception. Apperception characterizes the changes which take place in active consciousness. By it is meant *the synthesis in consciousness by which mental data of any kind (sensations, percepts, concepts) are constructed into higher forms of relation and the perception of things which are related becomes the perception of the relation of things.* "The two presentations *a* and *b*," says Lotze,[1] "constitute simply occasions whereby the reaction of a spiritual activity is aroused, through which new presentations—such as similarity, identity, contrast, arise—presentations which would not be possible without the exercise of this new spiritual activity." The relation of percepts is not the same as the perception of relation. Apperception is the comprehensive "power of discovering relations"; but is not limited to the operations of reasoning. It is the essential fact, as shall appear in all the stages of mental generalization.

This use of the word apperception to express the broadest act of mental relation is of great importance and value. The treatment of the very distinct and familiar act of mind in attention, of grasping details and relating them to one another in a new mental product, has heretofore been confined to its special operations—as perception, conception, judgment—to each of which a different name was given. The term apperception singles out that act of mind which is common to them all—the *relating activity* of attention—and thus, by its general application, emphasizes the unity of the intellectual function as a whole. In general, we may say, whenever by an act of attention

[1] *Outlines of Psychology*, § 24.

mental data are *unified into a related whole*, this is an act of apperception.

§ 3. Development of Consciousness.

The beginnings of consciousness are enveloped in great obscurity. Shortly after birth a child begins to show signs of memory and of the power of connecting impressions. But both the memory and power of association are very weak and depend upon intense degrees of excitation, as a very bright light or a very loud noise. When the child is several months old, a familiar person is forgotten after a week's absence. Gradually attention is discovered, at first vague and discontinuous, and after a few weeks becoming more persistent and intelligent. This is shown earliest for sight and touch, the two senses which discover space relations. It is probable that the earliest consciousness is a mass of touch and muscular sensations experienced in part before birth, and that it is only as the special senses become adapted to their living environment and sensitive to their peculiar forms of excitation, that the general organic condition is broken up and the kinds of sensation differentiated. This process of differentiation of the sensations of touch and muscular sense gives us very early the form of our own body and the locality of its parts, and this serves as point of departure for the placing of external objects. The movements of the body contribute largely to the apprehension of the dimensions, forms and areas of things in space. The movements of the body are at first random and without control, arising from nervous discharge under conditions of physical discomfort.

The child then passes through a stage of development in which its movements are largely adaptations of the organism to outside stimulations. After the sixth or seventh month imitation of others' movements becomes its prevailing reaction. In "persistent imitation"—the try-try-again, experience—we have the first voluntary efforts of the

child.[1] These effort-movements gradually take on a positive character, but even after two or three years it is difficult for the child to execute any given combination of movements. This fact of control of the body seems to be the first beginning of the exercise of will. It involves a subjective reference more distinct and peculiar to itself than any of the purely affective sensations, and leads on to the notion of the *I* and so to *self*-consciousness.

The development of consciousness is largely dependent upon the development of the physical organism. The senses must be awake to their functions before the mind can exhibit its functions. Not till the eyes are open and in proper movement can the impressions of that sense begin to play their very great rôle in the forms of external perception. So also must the centers become accustomed to their reactions. If we liken the elastive activities of the developed nervous system to lines of least resistance, we may say that, for the very young child, such organic pathways are largely wanting and they must be established and maintained by actual exercise. These early physical modifications becoming more and more definite and multiplied, the more complex forms of mental function are made possible. Like other organs of the body, also, the brain grows in size and complexity. It attains its largest size probably much before the maturity of manhood; but its structural development, which consists in the differentiation of parts for special functions and the establishment of various connections throughout its bulk, is then but well begun. The basal ganglia seem to develop their activities earlier than the cerebral hemispheres. This is to be expected, since they are connected with the organic and essential processes of the body.

[1] On the development of the child's active life see my articles, "Suggestion in Infancy," "Infants' Movements," "Origin of Volition in Childhood," in *Science*, February 27, 1891, January 8, 1892, and November 18, 1892.

The relative value of different images in the early stages of mental growth is illustrated by the following experiment[1] made by the writer upon a girl six and one-half months old. The child's nurse, who had been with her for five months, was absent for three weeks, and on her return was not recognized by her face alone, nor by her voice alone (spoken words), but was fully recognized by sight (face) and sound (nursery rhyme) images together.

§ 4. Nervous Conditions of Consciousness.

General Conditions. There are two great theories of the physical basis of consciousness: the first, represented by Mr. Lewes,[2] holds that the nerve-process, considered in its most general form as irritability, is everywhere conscious. On this view, each nervous center, each so-called arc, has its own consciousness, and the ordinary consciousness of the individual is only the outcome of many lower consciousnesses that we all possess. The brain-consciousness is the only one we are conscious of, so to speak; but there is consciousness in the spinal cord and in ganglia wherever we find them. The other theory, or class of theories, holds that a given degree of development is necessary before consciousness is found at all. In the development of the system, therefore, consciousness appears only at a certain stage of integration or "upward growth." This theory is generally accepted, though for purposes of division rather than from positive argument. In the nature of the case, it is impossible to disprove consciousness in lower centers.

It also seems true that our personal consciousness represents a condition of slow, difficult, and impeded—consequently of highly developed and well balanced—integration. The smoothest reflexes are not conscious; the hard-

[1] See *Science*, May 2, 1890.

[2] Held also by Bain (*Emotions and Will*, Appendix A), and in a modified form by Wundt.

fought decisions are most conscious. It seems likely, therefore, that some degree of inhibition is necessary in the nervous basis—at any rate for vivid consciousness.

On the other hand, there are considerations which are giving more prominence to the view of Mr. Lewes at present. They tend to show that our distinctions are arbitrary, and open the door at least for presumptive evidence that consciousness is coextensive with nervous reactions. Among these considerations are recent proofs of so-called multiple personalities which may be induced in the same nervous organism in the hypnotic state.[1] The explanation is at least a tempting one, that, the higher centers being inhibited, their conscious content is wanting, and the lower centers supply experience which was before outside the conscious area. Again, in the scale of animal organisms, it is difficult to draw a line denoting the point of nervous complexity below which there is no consciousness. The fact of a possible substitution of function between the brain and spinal ganglia spoken of above, would indicate a possible common element of consciousness.

Particular Conditions. A further question arises as to the immediate conditions of consciousness in the nervous centers. Given a nervous organism capable of consciousness, on what particular state or aspect of it does the continuous presence of consciousness depend? Here, again, recent views are little more than guesses. The view supported by Herzen seems to have most evidence, *i. e.*, that consciousness arises from the breaking down or expenditure of the cellular structure in the centers. This is concluded from the fact that the attention, a state of concentration and expenditure, is the state of most vivid consciousness; that consciousness is most vague and indistinct when no brain-work is being done, as in cases of *dolce far niente* or diffused attention; that unconsciousness is most nearly reached in sleep and analogous states when

[1] Pierre Janet, *Automatisme Psychologique*.

the brain processes have largely subsided from the lack of sensory stimuli or motor impulses. The chemical results of active thought, increased heat, and organic waste deposits in the brain would indicate chemical work and disintegration.

It is also true that consciousness depends upon the normal condition of the mechanism as a whole. Any failure in the blood supply (anæmia) leads to faintness and fainting, and the same result often follows from congestion of blood in the brain (hyperæmia). In general we may say that the healthful activity of the brain, in its normal physiological relations, gives clear consciousness. It should be borne in mind, also, that all hypotheses as to the conditions in which it arises shed no light on what consciousness is. On this point even the biologist Schneider is clear.

§ 5. Sentience and Sensibility.

It has become apparent that nervous activity, considered for itself alone, does not bring us into the range of psychological science. However we may decide the inquiry as to whether such activity is ever entirely free from consciousness, it is yet true that it may be quite outside of what is called the individual's consciousness. *The man* is not conscious after the guillotine has done its work, however active the nervous reflexes of his limbs may be, and however firmly we may believe that his spinal ganglia have an "inner aspect." In other words, the greater part of our ordinary nervous reactions are not above the threshold of our conscious lives. So we reach a distinction between sentience as a nervous property and sentience as a conscious phenomenon, between *sentience and sensibility*.[1] Sensibility is synonymous with the usual consciousness of

[1] Lewes uses the two terms in senses precisely the reverse of this, *Physical Basis of Mind*, p. 201; i. e., to him sensibility is the nervous property everywhere; so also Sergi, *Psychologie Physiologique*, p. 13.

the individual's experience, and sentience is the nervous function which, as far as we know, may yet be accompanied by consciousness or inner aspect in general.

For a working test of the limits of sensibility we may say that there is no sensibility (1) where there is no brain; (2) where there is no trace left in memory; (3) where there is no expressive or adaptive motor reaction. Yet in all of these cases sentience may be present, as the sensitive plant seems clearly to show.

The transition from simple sentience to the full consciousness is through subconscious modifications. On the side of the nervous system they indicate a stimulus and reaction too faint to reach into the sensibility. Yet they influence the conscious life and give it direction and intensity; a fact seen again on the physical side under the principle of summation of stimuli.

§ 6. Kinds of Consciousness as Dependent on Nervous Complexity.

1. **Passive Consciousness.** Subconscious sensibility tends to secure recognition in the mental life as what is called *passive consciousness*, to distinguish it from the active forms which involve more or less attention. The writer often finds that he can start counting the strokes of a clock after the clock has struck several times, naming the correct number of each stroke to the end, although he was not aware of the strokes before he began to count. This illustrates the subconscious. In most cases passive consciousness is, by its very nature, undetected, and it exists as a normal state apart from active consciousness only in lower forms of organic life or in very young children. In adult life we catch it most nearly when just beginning to recover from a swoon; the sounds around us are heard, but have no *meaning*, relation, or escort. Of this state abstracted from the condition of our usual self-consciousness, we may make the following remarks: 1. It is a state

of pure sensibility or simple awareness. 2. It carries no reference to an external object or to the body, that is, no such reference inside the inner aspect. 3. It has no reference to self as an object of inner apprehension, no voluntary effort known as "my effort." 4. It has no relational or apperceptive quality. It is not knowledge, but pure feeling. It is the hypothetical *affective* state in all its purity.

The possibility of turning attention to a dim presentation and making it vivid, shows that the cerebral basis of these lower forms of human consciousness is not one of separateness from the highest centers, but of community with them; indeed a nervous discharge already in voluntary operation may be diverted into a subconscious reaction without the attention. The physiological basis of passive consciousness, then, is a state of temporary loss of tension in a brain-area which shares in the highest integration and instability.

2. **Reactive Consciousness.** By reactive consciousness is meant the state commonly designated as *involuntary attention*. In passive consciousness only the reception of stimuli is a matter of sensibility; here consciousness seems to attach also to the responsive member of the nervous arc. There is as truly a reaction in consciousness as there is in the nervous system. We may accordingly analyse this form of consciousness for purposes of treatment into three elements, corresponding to the three elements of the nervous arc. First, the receiving consciousness, the stimulus—say a loud, unexpected sound; second, the attention involuntarily drawn, the registering element, as appears below; and third, the muscular reaction following upon the sound—say flight from fancied danger. The analogy, accordingly, between the typical brain process and the typical mental process finds here its most general force and demands the most careful treatment. Questions of the most radical philosophical importance begin here.

Characteristics of the Reactive Consciousness. In general, this form of consciousness is distinguished by a feeling of *expenditure*. Attention always means expenditure even when quite involuntary. Any further designation would only becloud a sensation which everyone can point out clearly enough in his own experience—the sense of being caught and carried away mentally.

Again, the reactive consciousness has an additional element which we call the sensation of *fatigue*.[1] This sensation is distinct from that of expenditure, and arises only after prolonged attention or in conditions of antecedent nervous exhaustion. As to what this feeling is, again no further description is necessary now.

Moreover, on the muscular side we find two different classes of effects: the reactive effects peculiar to the particular stimulus, and besides these the peculiar muscular accompaniment of attention itself. The latter are constant, and the former vary with the stimulus. For example, a student hears his name called suddenly and loudly. The particular reaction habitual to such a stimulus is a speech reaction—the response, Hallo! or Yes! But, before speaking, he finds he has turned his attention—probably his head—to the source of the sound, and by so doing has brought into play a different set of nerves and muscles. Now, of these two reactions it is the speech-reaction which answers in consciousness to the motor side of the nervous arc, stimulated by the sound, and it is only this that we can say follows the attention without finding ourselves on debatable ground. The attentive movements seem to belong peculiarly to the attention itself, and so fall under the central element in the typical reaction.

Consequently, in the motor phenomena of the reactive consciousness, there are two very distinct elements which subsequent discussion must not confuse: the motor effects of the stimulus which is attended to, and the motor accom-

[1] Discussed below, chap. xxiii. § 4.

paniments of the attention itself. This may be seen in Fig. 14, in which a new[1] element (cc = co-ordinating center) is added as the central process of attention. A new motor process (mp') is stimulated, and thus produces new muscular movements (mt'). The ordinary reaction also takes place (mp, mt; in this case, speech) following from the ordinary stimulus (sp; in this case, sound). The

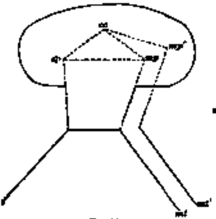

FIG 14.

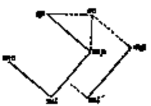

FIG 15.

sp, mp, mt = Motor reaction
sp, cc, mp', mt' = Motor accompaniments of the attention.

matter is again simplified in the "motor square" diagram, Fig. 15.

3. **Voluntary Consciousness.** Voluntary consciousness may be characterised by several new affective elements—new modifications of sensibility. Without anticipating later analysis, we may say that it exhibits, first, *deliberation*. By this is meant, in general, a doubleness of sensibility, a consciousness of being drawn apart, or of inward conflict—to limit the case to the feeling aspect, apart from the play of ideas involved. This feeling of deliberation leads on to another element of sensibility, namely, the feeling of

[1] Cf. Figs. 11 and 12, above.

decision or *consent*; in which the doubleness spoken of is resolved in a pleasant unity of consciousness again. And further, we find another possible element, apparently distinct from the preceding, the feeling of *effort*. In this sensation there is an active identification of ourselves with the reaction decided upon; a conscious putting forth of ourselves to reinforce our decision. Any analysis of volition must, at least, take account of these three distinguishable aspects of sensibility.[1]

Now it is in the selective and inhibitive functions of the nervous system that the physical basis of the voluntary consciousness is to be found. As far as such selection and inhibition are conscious at all, they have probably the nervous essentials of volition. Of the three sensible elements involved, the first and second have clear physiological analogies. Deliberation in consciousness is analogous to dynamic complexity and instability in the brain-centers; there is such a thing as temporary balance in the nervous system, and it suggests itself at once as the physical counterpart of mental hesitation. Inhibition also, as far as our physiological knowledge goes, seems to have full conscious value here. Decision, as following upon deliberation, is again analogous to the state of central readiness for the discharge of nervous force, when the equilibrium is destroyed and the motor outburst only waits for the requisite stimulus to take its outward course.

With effort, however, the case is on the surface different. There is no evident nervous function corresponding to this state of sensibility; that is, no function not already supplied with its conscious analogy. The question of such an analogy or physical basis of effort, therefore, comes finally to wait upon a more thoroughgoing mental analysis of this sensation. If effort be reduced to expenditure, and expenditure to incoming sensations from the muscles, then there is

[1] For detailed consideration of these three features of voluntary consciousness, see below, chap. xxvi. and xxvii. § 1.

no need for such an analogy; but if effort resist further analysis, then physiology is as yet at fault.

Fundamental Properties of Consciousness. The general fact is evident, in view of all that has been said, that different events in consciousness are of different value, come in with a different introduction, have different qualities which mark each as *itself* and not another; in short, that consciousness has a fundamental property of *discrimination*: and further, it is clear that under these differences in its events consciousness acts differently, courting some changes and avoiding others, reacting *so* on one stimulus and *thus* on another—the further fundamental property of *selection*. We have found, also, that consciousness has *degrees of excitement*,[1] intensity, coloring, of its own according as this event happens in it or that. These properties are evidently the basis of the threefold division of conscious states already pointed out: Intellect (discrimination), feeling (degree of excitement) and will (selection).

§ 7. The Nervous System and the Unity of Consciousness.

The functional unity of the nervous system has already received sufficient emphasis. The conception advocated in the preceding pages is a dynamic conception. The parts of the system have meaning only as they are related to each other in a system whose activity as a whole gives value to the activity of the parts in the general life-process. We have not many nervous systems, but one; the laws of its growth are not many, but one; its function is one, its teleological end is one.

So consciousness has not many forms, passive, reactive, sensory, motor, voluntary, inhibitive. These are all partial aspects of a single unitary presence. There is no sensor

[1] On the relation of this property to pleasure and pain, see chap. xvi.

phenomenon but has its dynamic or reactive side. There is no motor phenomenon in consciousness, but it springs from antecedents of sensibility. There is no voluntary phenomenon, but it rests on both. Consciousness, therefore, is one as the nervous process is one.[1]

[1] See a statement and criticism of the theory which accounts for mental unity by the organic unity of the nervous system, in my *Handbook of Psychology*, vol. ii. chap. ii. § 6.

CHAPTER VI.

ATTENTION.[1]

§ 1. Definition of Attention.

In the consideration of consciousness, a difference was found in its general aspect according as a number of presentations were loosely scattered about its field or as some one held the mind directed to itself. Consciousness is thus *passive* or *active*. Active consciousness is in general attention. It is the focusing of the mind upon a presentation. It is in all cases a conscious act. What goes on in the relating of this presentation to others, in their combination, dissolution, arrangement, is due to the activity of apperception, which is, in a large measure, subconscious; but the attention which makes the activity of apperception possible is a matter of immediate consciousness.

Reflex or Involuntary Attention.[2] Upon observation of ourselves, we find that attention may be stimulated either from some foreign and unexpected source or from the will. A loud noise, a violent contact, a disagreeable odor, at once attract the attention without our volition or even against it. This is *reflex* or involuntary attention. In the normal state of the consciousness, attention is constantly open to appeals of this kind. Minds with little power of will live under control of such external excitation. The attention is drawn hither and thither in rapid transition with no fixed concentration upon any sensation or idea. In such minds, as we shall see later, the functions of apperception are disturbed, and its products instable.

[1] *Handbook*, vol. i. chap. v.

[2] On involuntary attention considered as reactive consciousness, see above, chap. v. § 6.

This state of inability to hold the attention against other solicitations is called *distraction:* the attention is, as it were, drawn apart in its efforts at adaptation to different conditions.

A case of what may be called chronic involuntary attention is found in the *insistent* idea. It very frequently occurs in normal life that a single idea, either by reason of a strong association or of a feeling, or because of previous attention, or even in consequence of the very effort of the will to banish it from consciousness, remains before the mind and holds the attention. This is called an *insistent* or, in its more intense forms, *fixed* idea. It is generally removed by a change of scene, companions, and surroundings, the old association being broken or new ideas claiming the attention. As an idea becomes fixed or imperative, it gathers round it other ideas in growing associations and connections, which soon give a morbid tone to the entire mental life. This is the beginning frequently of monomanias and permanent delusions,[1] which become chronic in insanity. Frequently also, it is supposed, the primary tendency to some form of nerve disturbance or brain disease, due to heredity, gives occasion and strength to such derangement.[2]

The mechanical nature of involuntary attention and its intimate relation to all physical and mental states is seen in the acts of a patient in a state of hypnotic hallucination. Here it seems that the element of will is entirely eliminated. The patient has apparently no control over either body or mind, and many suggestions either physical or mental from the hypnotizer are immediately realized in action. It seems only necessary that the attention should be secured, to start the entire train of apperceptive processes with the physical changes which are associated

[1] See case described by Cowles, *Amer. Jour. of Psych.*, February, 1888.

[2] See further statement below, chap. xiv.

with them; or a physical attitude or movement may be forced upon the patient, only to be followed by all the emotional and intellectual states it suggests. In these states the intellectual life seems quite normal and the emotions are very excitable and facile in their play; but all inner control is lost. Action results with complete necessity. The important fact in this form of hypnotism then seems to be the fixing of an idea till it becomes imperative, with the general subjective state unchanged by the substitution of ideas which it brings about.

Voluntary Attention.[1] In strong opposition to this is *voluntary* attention or attention proper. It may be defined as *a state of active consciousness due to voluntary mental exertion or effort*. Here a distinctly new element enters into consciousness, mental effort. In voluntary attention we find the first exhibition of will. It is the beginning of all control over the mental life. A thousand things may appeal to me for consideration and I may refuse them my attention. I may give myself to a train of thought and be substantially unconscious of sounds, sights, contacts which would ordinarily excite my attention. It is thus in the familiar condition of *abstraction* or *absent-mindedness*. This peculiar outgoing of the self is the something we call consent, in the mental life. From it we largely arrive at consciousness of self, by a reference of what we do, to ourselves as doing it.

The frequent or prolonged exercise of attention to the same presentation or idea tends to bring it involuntarily before the mind. Its repetition in varied circumstances establishes various associations by which it may be revived. Insistent and fixed ideas usually become so from voluntary thought upon them—from what we call "brooding" over a subject. Thus the line between reflex and voluntary attention is changed and much that was before a matter of choice becomes automatic and necessary.

[1] See also the discussion below, chap. xxvii.

§ 2. Bearings of Attention in the Mental Life.

In its relation to the great classes of mental facts, the attention is of the first importance. In general it may be said that *attention intensifies a mental state*. It may be considered more particularly and in detail.

I. **Relation of Attention to Sensation.** There is a twofold or reactive relation between attention and sensation. On the one hand, *increased intensity of sensation draws the attention.* The change in intensity of the sensation is a direct stimulus to the attention, and the attention in this case is reflex. On the other hand, *attention directed to a sensation increases its intensity.* We have already seen that many sensations may lie in consciousness almost unfelt, while the attention is otherwise occupied. It is only necessary to direct the attention to them to give them their full force. But more than this, the attention may give them increased and very acute intensity. By fixing the attention upon bruises and burns, we increase the pain they give us. Hence the efforts we make to divert a sick man's attention from the seat of his disease, by fixing his attention on some new artificial sensation, or by interesting him in another topic of conversation. Hot cloths relieve headache, by producing a counter-irritation. This effect of the attention is especially great in nervous diseases. Paralysis has been cured or driven from limb to limb in hypnotic patients by a mere suggestion, which so completely occupied the attention as to induce belief in the effect. So insomnia and sometimes dyspepsia and other diseases may be cured.

Attention has an influence also upon the time occupied by a sensation. Experiments show that a certain time is necessary for the feeling of an excitation from any of the sense organs and the reaction in the movement of the organ. This time is greatly reduced when the excitation is expected.[1]

[1] For details, see section on Psychometry, chap. viii. § 7.

A certain time seems to be necessary for the adjustment of the attention to the nature and source of the stimulus, and this is reduced when the idea is present beforehand and the attention is already partially adjusted.

II. **Relation of Attention to Movement.** The movement of the members of the body is very closely connected with corresponding ideas. No voluntary movement takes place without its idea in the mind; and often the idea produces the movement without any voluntary impulse or even contrary to it.[1] The imitative faculty of children shows this tendency to carry out all movements thought of. We often find ourselves following the movements of the hands or lips of a speaker with slight movements of our own. It is probable that no word comes into the mind without its partial formation by the vocal organs, as is seen in the movements of the lips by many in reading to themselves and in our thinking aloud. No doubt the physical association involved plays a great rôle in all such cases. The thought of a movement has preceded and led to the movement so often, that there is a positive tendency, at the nervous centers, to the discharge of the energy necessary to the accomplishment of the act, along the proper courses. An interesting illustration has recently come to light in the cases of loss of the power of speech simply from brain injury in the centers for writing the words.

This tendency to movement is greatly increased by the exercise of attention. The attention tends to bring the idea more distinctly before the mind and thus removes all competing ideas which should incite to different movements. This is especially the case when the attention dwells upon the organ or on the thought of movement. There is then a twofold effect due to the attention. It

[1] Féré claims that every sensory excitation at first induces an augmentation of motive force which is measurable on the dynamometer: see law of "mental dynamogenesis" below, chap. xxiii. § 1.

tends to develop latent sensations, as we saw above, in the organ, and those sensations lead to movement for their relief or continuance; or it produces movement by the distinct purpose to perform an act thought of. For example, if the picture is vividly presented of a workman who has his thumb crushed by a hammer, we make instinctive movements to protect the thumbs, by folding them in the hands.

The facts of hypnotic suggestion already spoken of show the automatic connection between an idea strongly attended to and its physical performance. The absence of will does not interfere with the performance of the action, but only with the power to prevent or direct it. The consciousness is so contracted in this state that each idea in turn is held in the focus of attention.

III. **Relation of Attention to the Intellect.** Attention, either voluntary or reflex, is directly involved in the operations of the intellectual function. In general, it may be said that attention increases the vividness of presentative states and thus renders more definite and lasting the apperceptive activities of synthesis, analysis, relation, as seen in memory, association, judgment, and reasoning. It is necessary, first, to the retention of images. The capacity to retain mental pictures depends upon the intensity of the original presentation, and the clearness of its relations; and this intensity and clearness are enhanced by the attention. The supply of materials which we have for use in the higher forms of thought depends at once upon our attentiveness to what passes before us in our everyday life. When we wish to retain any event, we press it upon the attention and note its surroundings. Second, attention increases the intensity of the reproduced image in the same way. If we recall the face of a friend, it is, at first, dim and indistinct, but by holding it closely before us and scrutinizing it, we can bring it clearly out in more detail. The attention shifts rapidly from point to point upon the

image. Third, the duration or time of all mental states, as of simple sensation, is made shorter by attention, as is seen in experiments on the association of ideas and estimation of differences.

IV. **Relation of Attention to Feeling.** Attention has the same intensifying influence upon the affective states in general as upon sensation. Emotion is heightened when the attention is directed to it. Hope, joy, fear, anger, grow very greatly in intensity when thought of, and as quickly die down when dismissed *from* the attention. With the higher emotions it is very difficult to control the attention, so thoroughly do they usurp the field of consciousness. So, also, pleasure and pain, called the hedonic *tone* of feeling, are increased by being attended to and diminished when the attention is withdrawn.

The especial relation existing between the attention and the feeling of *interest*[1] has often been remarked by psychologists. This feeling of interest is often akin to that of personal advantage or individual preference, which we find playing an important part in the flow of our associated ideas. It gives a spontaneousness and ease to the attention which renders the latter more effective and less wearisome to the inner life. Attention to that which interests us does not demand the same outgo of mental effort.

V. **Relation of Attention to the Bodily Functions.** Attention long directed tends to derange the automatic functions of the body. The automatic functions are those which go on unconsciously to ourselves. The action of the heart is accelerated by being closely attended to. The digestive apparatus may be deranged by being watched, and so also may the breathing process. Attention is also accompanied by certain attitudes of the body, such as turning the head or eye in a given direction, bending forward, frowning, and other muscular contractions. A feeling of tension is felt also in the end organ. This

[1] See discussion of "Interest," below, chap. xix, § 1.

tends to show that it is the motor elements of the brain which are involved in attention, while the effect it works upon sensation shows a sensory modification following upon the other.

§ 2. Educational Bearings of the Doctrine of Attention.[1]

Training of the Attention. The considerations already advanced tend to show the importance of the attention in education. The secret of the case rests upon making attention completely voluntary. Strength of thought depends very largely upon the voluntary control or concentration of attention, in such a way as to prevent distraction from accidental and unexpected influences. This training of the attention should begin at the earliest possible period. The child should be taught to observe continuously some thing that interests him, and encouraged to ask questions about objects and their relations. In very early life these things should be left to his own selection, until the laws of apperceptive synthesis are developed, that is, until he learns somewhat to connect things and events and see their bearings. Otherwise the forcing of the will may interfere with the development of the emotions, which are then the controlling factor. But as soon as practicable, the teacher should attract and hold the child's attention, at first to pleasant things and afterward to indifferent things. Great care should be exercised in the general surroundings. All distractions, such as open windows, pet animals, playthings, should be guarded against: they practically call upon the child to attend to several things at once. Care should be taken also not to fatigue the attention. The periods of study had better be too short than too long; for if the child grows tired, the effort becomes painful and the subject distasteful. Frequent recesses should be given and recitations should not

[1] See also Sully, *Outlines of Psychology*, p. 105.

be longer than fifteen to twenty minutes, for children under twelve to fourteen years of age. The child's interest should never be allowed to flag.

Habits of Attention. In this way regular habits of attention may be formed very early, which have the same force in life as all other habits. Attention thus becomes *application*, which is voluntary and agreeable: and with this basis the student has no trouble in devoting himself to subjects of thought for longer periods.

A caution is perhaps in order, as to sameness in the kinds of instruction given in early life. It is not well that the same general cast of thought should engage too much of the early attention of the student. It gives a bent to all his subsequent development. John Stuart Mill is a good example of this. It is especially dangerous when it involves the emotional side of our nature. Religious teachers use this fact not only properly to instruct in morality and religion, but also to excite early prejudices and repulsions which can never be shaken off. Nurses often give children associations of fear which persist through life. This is the origin, frequently, of the insistent ideas spoken of, which intrude themselves upon us and make many of us to a degree hobbyists and monomaniacs.

Attention Necessary to Apperception. As will appear later, it is only in and through the attention that the apperceptive function of mind comes into play. In its discriminating, selecting, and relating results, the concentrated attention is called apperception; but the active process which produces these results is the attention. Attention and apperception seem to be the subjective and presentational sides respectively of the same mental fact.

PART II.

INTELLECT.

CHAPTER VII.

DIVISION OF THE INTELLECTUAL FUNCTION.[1]

THE Intellect is the instrument of knowledge. Using the word "function" simply to mean "aspect," or "exhibition," we may say that Intellect has two functions:

I. **The Apperceptive Function**, which in turn comprises:

1. *Presentation* or *Acquisition*, being
   - *a.* Sensation;
   - *b.* Perception.
2. *Representation*, being
   - *a.* Conservation or Memory;
   - *b.* Combination;
   - *c.* Elaboration.

II. **The Rational Function.**

§ 1. DEMARKATION OF THE FUNCTIONS.

I. **The Apperceptive Function.** Under this function are included all those changes in the presented content of consciousness which take place under the form of apperception; those which owe their product to the concentration[2] of attention.

The function of Presentation or Acquisition is that by which the material of knowledge is gained. It covers the

[1] *Handbook*, vol. I. chap. vi.

[2] See the definition of apperception, above p. 88.

two sources of our knowledge in experience, *Sense-perception* and *Self-consciousness.*

The function of Representation, as the word implies, is that by which the material acquired in presentation is retained, reproduced, and intelligently used in the processes of mind. Its operations are considered under three great heads: *a.* Conservation or Memory, which includes the *Retention, Reproduction, Recognition,* and *Localization* in time, of Representations; *b.* Combination, which is the disposition of reproduced states in the new forms of the *Imagination,* the law of its disposition being *Association*; *c.* Elaboration, which is the function of intellect proper, constituting the operations of *Thought.* Under it we find again three mental stages, *Conception, Judgment, Reasoning.*

II. **The Rational Function.** In this aspect we view consciousness not as content, but as form or mold for the material of knowledge. All the foregoing operations, both presentative and representative, are subject to a law of universal validity, the law of *Identity* or *Non-contradiction.* And the intelligence when exercised upon things in general is governed by the principle of *Sufficient Reason.* As judgments these principles are also synthetic, but they seem to carry their own universal validity as matters of self-reflection, and not to be given in the content of apperception. These with other principles of the same nature, as causation, right and wrong, run through all knowledge and constitute the *Reason.*

THE APPERCEPTIVE FUNCTION.

PRESENTATION.

CHAPTER VIII.

SENSATION[1]

§ 1. General Nature of Sensation.

Sensations are the primary events of the mental life. They are so called because they arise through the senses. We use the word in its usual sense, as meaning the great body of psychological phenomena, both affective and presentative, which result within the mind immediately from impressions upon the senses. The experiences of moisture and resistance which follow from contact with a piece of iron, and the pain felt in case it is hot, are equally sensations.

Distinction between Sensation and Impression. Sensation being thus defined, it must be carefully distinguished from the physical phenomenon which precedes or accompanies it. The impression is the modification of the organ, especially of the nerves and nervous centers, which arises from an external stimulus; as the vibration of ether or air. The nature of the different sense impressions is not well understood; but in each case they are some form of movement. They have all the characteristics of physical phenomena: they can be located, measured, apprehended by the senses. Sensations, on the other hand, cannot be compared with movement of any kind. The difference between

[1] *Handbook of Psychology*, vol. i. chap. vii. and vol. ii. chap. iv.

them is plainly seen in the fact that an impression may take place without any sensation. The impression may be too feeble, or too prolonged; or too often repeated, as the irritation of our clothing, to which we are habituated; or the attention may be occupied, so that the impression does not produce its usual sensation.

Affective and Presentative Elements in Sensation. In most sensations there is a distinct knowledge element over and above the intensive subjective state, which constitutes the sensation proper. There is an element of knowledge of things without us or of our own bodies. This is the presentative or *perception* element in sensation. There are great differences in sensations in this respect.

The affective or feeling quality, on the other hand, comes out most strongly in cases of massive or voluminous stimulation: here presented relations are at a minimum and sensibility is at a maximum. When one plunges into a very hot bath, the feeling experienced is so overwhelming that the knowledge that it is a hot bath, and that it is I myself who am taking the bath, occupies a very slight degree of consciousness. We can imagine the diffused wave of feeling that sweeps over the jelly-fish when an unwary insect settles on its exposed surface. In a case of severe toothache, also, what we really have predominating in consciousness is not knowledge, but feeling. As an immediate state of consciousness, we do not *know* that we have a toothache, we *feel* it. Hamilton announced the law, already anticipated by Kant, that the two elements vary in inverse ratio—which is true only in a very rough way. The relation of the two elements in the different senses is spoken of in what follows.

§ 2. Characters of Sensation.

All sensations have certain general characters, which may be subjected to investigation. These characters are four in number.

I. *Quality:* that property by which sensations are distinguished as coming from different senses, such as color, sound, taste

II. *Quantity:* meaning intensity or mass of sensation. Investigations in intensity constitute *Psychophysics*.

III. *Duration:* the time occupied by the sense function with its accompanying physical and volitional processes. Investigations in this field constitute *Psychometry*.

IV. *Tone:*[1] the pleasure or pain which accompanies all sensation. These characters are considered in order.

§ 3. Quality of Sensation.

There is much uncertainty as to the proper classification of sensations. It appears very easy to discover at once what is immediately given as a pure and simple sensation. But it is not so. At the age of maturity, when one is able to make an analytical study of his states, he finds them no longer in that pure and primitive state which he would wish. They have undergone a twofold alteration. In the first place, all our senses act together, and different sensations, by virtue of the laws of association, are experienced as one. And further, by virtue of the same laws, intellectual elements are superposed upon our sensations, making them much more complex. These associations become, after time has made them habitual, almost indissoluble. So that it is very difficult to isolate the different sensations from one another, or the great body of sensitive data from the contributions of reason and experience.

Relativity of Sense-qualities: Contrast. Further, we find a series of phenomena which show that there is no fixed typical sensation of each quality; but that all determinations of quality are to a degree relative distinctions among many "moments" in consciousness. This principle of "relativity" is illustrated by the so-called *phenomena of*

[1] This word is used throughout for the expression "hedonic tone."

contrast. The general statement of fact is this: Any sensation (color, sound, taste) which occurs after or with other sensations (colors, etc.) is different from what it would have been if the other sensations had not been present, or if the other sensations had themselves been different; the variation, however, is within the same sense-quality.

In the domain of the special senses, such effects of one sense-quality upon another may be subjected to experimental determination by psycho-physical methods. The phenomena of color-contrast are the richest and best understood class of facts. In general, color-contrast means that when part of the retina is stimulated to react to a particular color, there is a tendency of other portions to react to the complementary color. For example, the so-called "Meyer's experiment" may be cited: put a scrap of gray paper on a colored (red) background, and spread over the whole a sheet of white tissue;[1] the gray scrap will now tend to assume the color complementary to the background (green). Recent research has developed a number of interesting optical phenomena of this class. Stumpf has discovered that the pitch of a note is modified by the occurrence of another note of a different pitch, in such a way that the interval between them is lessened. Striking contrasts are also easily demonstrated in color, light, and tone intensities. Contrasts of temperature are also easily brought about. Cold water feels colder if the hand is just from warm water. Differences in temperature of the two hands lead to exaggerated differences of sensation when they are plunged together into two vessels of water of the same temperature. Contrast is called *simultaneous* or *successive* according as the rival sensational qualities occur together or in succession.

[1] The white sheet over the whole is necessary to obscure distinct lines of separation between the colors beneath. If such distinct boundary lines are exposed, the contrast phenomena disappear.

Two theories of sensational contrast have been advocated, one called the "psychological," according to which such contrasts are due to judgment or synthesis, the actual sensations themselves having fixed and unaltered qualities. This has been held by Helmholtz, and has been used to support the theory that there may be "unconscious judgments." The other, the "physiological theory," holds that contrast-effects are due to complex conditions of stimulation. The different color-stimuli, for example, are not reported separately to consciousness; but only their united effect is operative in the optical center. Consequently, what we have is a case of summation or fusion of stimuli, not of comparison and judgment of sensational atoms. This latter theory is now completely victorious, principally through the brilliant experimental work of Hering.

Conclusion on Sense-qualities. It seems reasonably safe to conclude that there are well specialized nervous functions which correspond to the great differences of quality in sensations: this is shown by the fact that the differences are stable; that the senses are largely independent of one another in their activity; that each such function has normal minimum and maximum activities which give original degrees of intensity in consciousness. But within these limitations both qualities and intensities are subject to the law of relativity as well by reason of nervous summation as of mental synthesis.[1]

§ 4. Special Sensations.

Smell. The complication of data spoken of may be illustrated in the sense of smell. The pure sensation cannot be isolated: it involves both intellectual data and

[1] See the "Relation of Sensation to Knowledge," in my *Handbook of Psychology*, vol. II, chap. iv, § 1, where the presentative or knowledge element in sensations is shown to be due to an early apperceptive synthesis.

a multitude of other sensations. Among the acquired notions which a given odor involves, is the representation of the object from which the odor proceeds, an association extremely serviceable to man and animals in finding and testing food; the more or less exact notion of the direction and distance of the object; and finally, the idea of the organ of the body which is affected. The localization of smell in the nostrils is very vague and gives us little knowledge. On the other hand the concomitant sensations with which this sense is connected are very numerous and complicated. First, there are organic and vital sensations arising from the digestive and respiratory tracts. We distinguish between appetitive odors and nauseating odors. The odor of meat excites the appetite of carnivorous animals, and that of a full pantry moves our own. And in relation to respiration, odors are fresh, as that of Cologne water, which excites a feeling of freedom in breathing; or suffocating, as that of a long shut up house, which seems to hinder respiration. Second, we find sensations of taste always associated with those of smell. The organs of taste and smell seem to act in sympathy. We speak of delicious odors as giving us a taste of the object beforehand. Third, sensations of touch are associated with smell in the mucous lining of the nostril, as in impressions which involve a tickling sensation. Fourth, there are also muscular sensations arising from the movement of the nostrils in breathing in odorous vapors. Fifth, to these we add sensations of temperature, heat and cold. The odor of camphor seems cold and that of alcohol warm.

It has been found impossible to isolate pure sensations of smell for classification or description. The most we can do is to throw them into general classes, as aromatic, fragrant, pungent, which are not at all exhaustive. This applies in a measure also to the other sensations, though in a less degree in the higher senses—sight, touch, and sound.

Taste. Taste is involved in the same obscurity. We

only know that it has its organ in elements on the surface of the tongue, called gustatory bulbs or flasks, which communicate with the sensorium by the lingual and glossal nerves. The intimate connection with smell is seen in the fact that the impairment of smell by disease or cold injures the power of taste. Tastes are infinite in their variety and cannot be classified. Certain classes of tastes are well discriminated in experience, such as sweet, bitter, sour; but they are very few compared with the vast number which remain undescribed. The presentative element in sensations of taste is very slight. We have an indefinite feeling of the locality of the sensation, but this arises, in the main, from feelings of touch upon foreign substances in the mouth, and from the muscular movement of the organs involved in eating or drinking. No knowledge of the object affecting us is given immediately in either taste or smell, since the stimulating agent is in gaseous or soluble form.

Hearing: Presentative Elements. Sensations of sound have a specific quality which is known through the ear.[1] The psychological value of these sensations consists in the fact that they occur purely in time and have no spatial quality. A series of sounds is the type of pure temporal succession.

The three most presentative classes of sensations, we have said above, are those of sound, sight, and touch. In the case of sounds we find peculiar properties upon which exact methods of research may be brought to bear. These properties, however, are presentative only in as far as they sustain relations of time. Like other sensations, sounds may be distinguished in *intensity* in an exact way. This intensity depends upon the amplitude of the vibrations of the sonorous body. Further, they are distinguished in their *timbre*, which depends upon the addition to the vibra-

[1] For the mechanism of hearing, see Bernstein, *Five Senses of*

tions, which produce the fundamental tone, of other vibrations twice, three times, . . . as rapid. This difference in timbre gives its characteristic sound to each different material, as metallic, vegetable, and thus corresponds to the difference in kind of odors and tastes. But the special peculiarity of sounds in this particular is found in what is called tone as distinguished from noise. This quality of the tone or note is *pitch* or *height*, depends upon regular periodical vibrations, and varies with their number. There is nothing corresponding to this in smell or taste. We cannot make up a scale or gamut of tastes as we can of notes. Upon this peculiarity of sound, having its basis of sensation probably in the fibers of Corti in the cochlea of the ear, or in the fibers of the basilar membrane to which they are attached, the whole science of music is built up. There is probably, in the inner ear, a series of vibrating elements which correspond, though more minutely, to the intervals of the musical scale. The perception of distance and direction by the ear is largely acquired by association.

Sensations of sound are singularly free from the disturbing influence of other sensations, and for this reason they are directly accessible to experimental researches of all kinds. We shall find this the case in speaking of the other characters of sensation.

Sight.[1] Sight is perhaps the most presentative sense. It is the medium of much direct knowledge of the external world. Its affective qualities consist in the pure intensity of the light sensation—as the light of one candle or of two—and in the distinct order of sensations known as *color*. The sensations of color arise from the varying rates of vibration of particles of luminous ether. These different rapidities give an ascending scale through the seven colors of the rainbow, from the red to the violet, similar to the scale in sound sensations, though not as extended or exact. The

[1] For the mechanism and general facts of sight see Bernstein, *loc. cit.*, and Le Conte, *Sight*.

colors shade off into one another with no regular law of change. Sensations of color have *intensity*, *saturation*, and *tonality*. The intensity, says Helmholtz, depends upon the quantity of light. Saturation is the relative purity of a color. Degrees of saturation are known as shades, as pink in its relation to scarlet. Tonality is the quality of the color as determined by its position in the scale of the spectrum, as blue, green, yellow.

The spatial form of the objects of sight is one of the most interesting of its presentative properties. This will be discussed in the section on space-perception.[1] The fact that there are two eyes contributes to this result, especially in the perception of the third dimension. It is difficult to isolate pure sensations of sight from the muscular and tactual sensations which are always, in actual life, associated with them, and it is probable, as will appear later, that these—especially the muscular sensations—are also concerned in the formation of the notion of space.

In regard to the process of the perception of color through the eye, two principal theories have been advanced, assuming that the retina is distinctively the locus of this process. We find, in the retina, distinctly differentiated and minute nervous elements called rods and cones which, it is thought, react locally, thus making possible the picture of the object seen. But as to the color sense proper, the case is more uncertain. According to the Young-Helmholtz theory there are three different kinds of nerve fiber, each of which reacts to one of the three fundamental colors, red, green, and violet; the other colors are complex and result from their combined action. This theory was, until recently, very generally accepted. Among other objections to it, it is urged that the microscope reveals no such differentiation of fiber, and the smallest sensation which can be perceived by the eye is of white light, which involves all these elements. The other theory is that of E. Hering, who supposes that there are two elements or substances each capable of

[1] Chap. ix. § 4.

two different reactions, thus giving four fundamental colors, red, green, blue, and yellow. This theory, however, has also grave difficulties to face. Yellow can be produced by color-combination. Neither theory explains color-blindness.

The phenomena of *color-blindness*[1] support the general view of the differentiation of structure or function in the nerve elements of the retina. This is the inability of about one person in twenty to distinguish certain colors. Blindness for red is most common. It is thought that all cases can be reduced to blindness either for red or green; though there are cases in which only different degrees of gray are distinguished. To the latter all objects seen are like the photographs of the same objects. Different regions of the retina have different degrees of sensibility to color; this sensibility growing less as we go outward from the central part. The outer rim of the retina is normally insensitive for red, but reacts for the other colors. This shows that there are special elements which react only to red.

A further phenomenon, that of *after-images*, is especially noticeable and important in sight. After-images are the persistence of sensations after their peculiar stimuli have ceased to act. Look at a bright window and then close the eyes, and the after-image is seen. This is called a positive after-image, and is due to the dying out of the nervous process. Further, if the bright object be colored its after-image plays between that color and its complementary (the color needed to make white in composition with it). This appearance of the complementary color involves additional elements to those originally stimulated and this latter fact makes it a *negative* after-image. It is due to the exhaustion of the nervous elements involved in the original color, by which white light is broken up and only the complementary elements act. This persistence of sensation in the organism is important as explaining compound and intense forms of excitation. As Fechner has pointed out, the after-image

[1] See "Report on Colour Vision," *Proc. Roy. Soc.*, 1892, No. 311.

has only two dimensions, and thus differs both from the actual percept and from its revived image.

§ 5. Common Sensation.

Divisions in Common Sensation. Such a division is based upon the physiological differences to which we would expect some conscious counterpart. The great organic processes of the body go on under the lead and control of automatic nerve-reactions; a body of nerves are delegated to this post of function; there are accordingly *organic sensations*, the subjective indications of organic health or disease. Again, the periphery of the body is supplied with a mass of fibrils of incalculable delicacy and number which have no representation in the list of special sensations; accordingly a great variety of more or less distinct forms of sensibility seem to originate in the skin and are called *cutaneous sensations*. Further, consciousness of movement, the so-called motor consciousness, is found on examination not to be simple. It involves an exceedingly complex nervous apparatus, both central and superficial; and all the forms of sensibility which pertain to muscular movement may be designated by the general name *muscular sensations*. And, finally, the nervous elements are themselves endowed with sensibility. Besides reporting the forms of stimulation which reach the organs with which they stand in immediate connection, the nerves report a variety of conditions to which they are themselves directly sensitive. All such modifications of sensibility may be called *nervous sensations*.

Organic or Systemic Sensations. There are throughout the body various organic sensations which are quite internal and only indefinitely localized. Such are the visceral sensations, respiratory sensations, feelings of bodily comfort or discomfort in general. Their most marked characteristic is their tone value, the high degree of pleasure or pain which they contain. These sensations, however vague and gen

eral, are of great importance to the mental life. They are the background of our emotional condition—since they indicate an elevated or depressed condition of bodily vitality—and give general cast to our state of mind. The dyspeptic soon becomes unreasonable and gloomy, and biliousness interferes with the normal activity of the mind. The general condition of the sensorium as a whole is often a determining factor in thought and conduct. It is noticeable that changes in climate and weather have a great influence upon these organic feelings, largely through the elevation or depression of the respiratory function. More particular sensations of this class are the organic needs—hunger, thirst, air, sleep, exercise, etc., and those connected with the circulation of the blood, such as congestion, throbbing, faintness, etc.

Cutaneous Sensations. In connection with the skin an enormous variety of feelings are reported in consciousness. Of these, three general classes lay claim to special end apparatus, sensations of touch, temperature, and pressure. Besides these, the more definite sensations having their stimulation in the skin are those of itching, scratching, flesh-crawling, tickling, and feelings of the sharp, blunt, hard, soft, rough, smooth, coarse, sticky, damp, dry, oily, etc. Nothing more can be said of most of these forms of sensibility. They are present in greater or less intensity and delicacy wherever the skin is normal.

Touch. Sensations of touch constitute the basis of a variety of states which we distinguish ordinarily as qualitatively different. An element of touch enters into sensations of muscular movement, both from external contact and from the rubbing of the inner parts against one another. Besides, we distinguish sensations of the rough, smooth, coarse, polished, damp, and sticky; but physiologists have shown that they are not special sensations, as Reid believed, but modifications of touch, combined with feelings of *pressure*. The importance of touch, as being

capable of so many modifications, as having its end organs over all parts of the body, and as acting in conjunction with other sensations in their peculiar organs, is seen to be very great.

The presentative quality of touch, considered quite alone, is space, as it is built up from the recognition of the locality of the parts of our own body.[1]

The nerve elements of touch, as well as those of pressure, are clearly defined. They are corpuscles situated in the skin, which communicate directly with the great sensor nerves by ramifying fibrils. These corpuscles are distributed in varying number in different parts of the skin. The experiments of E. A. Weber showing this are celebrated. He employed dividers opened at varying degrees, the minimum distance felt between the points being the diameter of the smallest "sensation-circle." The tip of the tongue and the red of the lips have great delicacy of touch; while the back of the neck is very insensible. The circles, however, are not the smallest units of tactual sensation and must contain many nerve elements; for it has been shown that there are distinct and very minute pressure spots within these circles. The same is seen in the marvelous capacity of both these senses to become more delicate with exercise. In the hypnotic state, also, delicacy of discrimination by touch is greatly exaggerated.

From the universal presence of touch and its immediate reference to the external world, it is of great importance in cases of appeal from the other senses, and in cases of hallucination. When in doubt about the objects of vision or sound, we feel after them with the hand. For this reason touch is called the "controlling" sense.

Temperature Sense. The last of the senses, in order of discovery, is the temperature sense. Like touch, it is a universal sense and has its end apparatus in the skin. Minute points called "temperature spots," which react, some for heat and others for cold, are scattered over the skin in

[1] See chap. ix. § 4.

varying degrees of nearness to one another. They have been plotted on the backs and palms of the hands and on the arms. Of the different nerve terminations in the skin —elements of Krause, Paccini, and Meissner—it is impossible to tell which belong to touch and which to temperature. The varying number of these spots in different localities and the consequent variations in delicacy of perception of heat and cold, make quantitative measurements for this sense very difficult. These sensations have a very slight presentative element in their vague reference to bodily locality.[1]

Muscular Sense. The earliest of the senses in its development is the muscular sense. By it is meant feelings of the activity of the muscles of the body as concerned in movement. As to the existence of such a class of sensations, as seen in lifting, pushing, straining, and in the weariness that follows muscular exertion, there is no doubt. Many psychologists, however, attempt to resolve them into sensations of touch, or consider them as an "assemblage of sensations of different categories." The former, however, cannot be held, since such sensations remain after complete destruction of the sensibility of the skin in cases of anæsthesia of the limbs. Beaunis finds that a singer retains control over the vocal chords after their sensitiveness to touch has been destroyed by cocaine. Clinical cases show the same for the limbs. This indicates that the skin is not the exclusive organ of muscular sensations. But, further than this, the muscular sensations have characteristics peculiar to themselves.

Analysis of Muscular Sensation. 1. *Kinæsthetic Sensations.* Suppose for clearness, in the first instance, a case of mechanical movement. My right arm is lifted swiftly by a friend, my own attitude being that of entire passivity and non-resistance, and when level with the shoulder the elbow, wrist, and fingers are in succession flexed. What do I feel?

[1] On the temperature sense see Donaldson in *Mind*, x. p. 399.

In the first place, I have certain particular feelings from the *skin:* the feeling of *passage* through the air, due mainly to a lowering of temperature, and the feeling of *stretching* where the skin is tightly drawn. The flexing of the finger backward brings out this feeling of cuticular strain. I also experience sensations of *touch* if the skin breaks contact or comes into contact with any external body, as the clothing of the arm. In the second place, I have certain particular feelings from the *muscles*, which are clear enough to be easily distinguished: the feeling of *contraction* in the muscle itself, and feelings of *pressure* of the parts of the organs against one another, or of a muscle against an obstruction.

Besides these particular and more or less clearly localised feelings, there seems to be a sense of whereness or *massive locality* of the limb, as a whole, in reference to the body. This feeling appears to be made up of elements of *tension* or strain in the body of the muscle, and of similar strain in the ligaments, tendons, and especially in the *joints*. In the case supposed, this last feeling is plainly localised in the shoulder and elbow joints. To these must be added the sensations of *muscular fatigue*, now demonstrated by Maggiora and Mosso, which follow the prolonged use of the same muscles.

Taken together these more or less distinct kinds of feeling are known as sensations of movement. The expression is so ambiguous, however, having been applied by some writer, perhaps, to each of the subordinate feelings in turn, that a better name for the class is at hand in the Greek equivalent *kinæsthetic sensations*. The further point of interest in them is that the nervous process which reports them to consciousness is plainly a sensor or *afferent* process.

Kinæsthetic Sensations as Immediate or Remote. The sensations of movement heretofore described have their stimuli in the organ itself which makes the movement.

Such feelings are *immediate*. On the contrary, such movements may themselves serve to stimulate one or other of the special senses, giving a new class of sensations which report the movement. Such movement-reporting sensations from other senses are *remote* kinæsthetic. For example, when I move my arm with my eyes shut and in the presence of noises which prevent my hearing the rustle of my clothing, etc., my sensations of movement are immediate. I now open my eyes and see the arm move and listen attentively and hear it: the optical and auditory sensations now added to my consciousness are remote kinæsthetic feelings. It is important to note that our feelings of movement are perhaps never free from these contributions from remote sources. They almost always enter in a complete statement of the case.

The nervous arrangement which underlies this confluence of immediate and remote sensations is only another illustration of the dynamic unity of the brain as a whole. The centers for sight and for arm movements, for example, or those of hearing and of vocal movements, have connecting pathways between them. The activity of one center stimulates the other directly, and both discharge into the motor course with which one is immediately and the other remotely connected.[1] On the other hand, instead of reinforcing a discharge, a remote sensation or memory may inhibit it altogether. These two influences from the same remote center are illustrated in the fact that in reaching for objects the eye estimates the distance, and leads to our putting forth more effort to stretch across it as the object is farther removed; but when a certain distance is reached

[1] This is clearly illustrated by cases in which patients are unable to move their limbs so long as their eyes are closed, but can do so when they see their limbs. This means that the direct channel into the limb center is blocked, but the indirect channel through the visual center is still open. Writers who do not accept sensations of central innervation hold that all voluntary movements are stimulated by kinæsthetic feelings either immediate or remote.

the same kind of estimation by the eyes leads us to give up the effort altogether. In one case the optical sensations reenforce the stimuli to movement, and in the other they inhibit the movement.

Furthermore, what is true of sensations in general as regards their possible reproduction or memory is true of these states of the sensibility. The special basis of memory will be seen to be identical with the nervous conditions of the original experience. It follows, therefore, that the brain centers which receive and register these kinæsthetic feelings are also the seat of kinæsthetic memories. From the nervous point of view, any form of stimulus which excites the kinæsthetic center or centers may bring up images of movement, and may, through these images, serve to start a brain process which issues in a series of real movements. What we may call the motor or stimulus value of these sensations is accordingly preserved in a weaker degree in the motor or stimulus value of their memories, both immediate and remote.

2. *Feelings of Innervation.* Continuing the analysis of the muscular consciousness as it arises from a particular movement, and passing from mechanical to voluntary movement, several more vague and indefinable elements may be pointed out. First, there seems to be a consciousness of the state of the motor apparatus as a whole, as capable or incapable of the movement in question. *It is felt in the system as a disposition or indisposition for action.* Considered as a state of readiness or the contrary, it may be called feeling *of motor potential.* It seems to be plain in the different consciousness we have of the power of the right and left arms respectively.

Fatigue takes on a peculiar character also when the fatiguing movement is voluntary; at least such movement is more fatiguing than mechanical movements. No doubt in the case of voluntary movement more nervous energy is employed. And it seems equally clear that in the two

kinds of movement the kinæsthetic feelings remain about the same. If these points are true we must hold either that all fatigue is nervous, or that there are two kinds of fatigue—muscular and nervous. This last hypothesis is proved by the experiments of Mosso and Waller, and also gathers support from the feeling of intellectual fatigue spoken of above, which would have less of the muscular and more of the nervous element.[1]

Effort and Resistance. There are accordingly two distinct elements involved in voluntary movements of the muscles: first, a *feeling of effort*, and second, a *feeling of resistance*. The feeling of effort arises from the condition of the nervous centers, and is called also *feeling of innervation*. The feeling of resistance, on the other hand, seems to have its seat in the muscle affected, being *kinæsthetic*. The latter is felt as opposition to muscular movement. Both of these seem to be involved in muscular sensations, though either may be present without the other. In cases of paralysis and muscular anæsthesia, there is the feeling of effort with no corresponding muscular movement; and, on the other hand, if the hand or arm be contracted by galvanism, in contact with a solid body, we have the feeling of resistance or pressure without that of effort. The clear distinction between the two classes of sensations is seen in a case reported by Demeaux[2] of a woman who had lost all muscular sensibility, both deep and superficial, and while the power of voluntary movement remained, was yet ignorant of the actual movement, and the position of the limbs. The sense of effort remained, but the sense of resistance was gone. The feeling of effort accompanies the exercise of will in the adult consciousness; but in child life it has its counterpart probably in a sensation of out-

[1] Mosso proves that both are present after hard intellectual work. Cf. Waller's able article, "The Sense of Effort," in *Brain*, 1891, p 179.

[2] *Brain*, March, 1887, p. 11.

ward nervous pressure, as soon as the limbs are moved and encounter resistance; and the idea of self as active probably develops out of sensations of the kind. Around them the beginnings of attention arise. Feelings of resistance also arise equally early in child experience and are exceedingly important as giving the first knowledge of the external world.[1] We are conscious of opposing force, and thus arrive at the first condition of matter. It is well to repeat that it is through muscular sensations, with the attention and will which they involve, that we come to have the idea both of mental and of physical force.[2]

Presentative Element In Muscular Sensations. Combined with touch, the muscular sense affords us knowledge of extension and force. Sensations of contact, as will be seen below, repeated on successive portions of the skin or by the same portion on different parts of the object, present data for the projection of a flat surface. It is by pressure added to these sensations that we come to apprehend depth. It is sufficient to remark this here, reserving its further discussion for the section on the perception of space. Mr. Spencer, speaking of the sensation of resistance as involving that of effort, says: "This sensation is at the bottom of our conception of the material universe, for extension is (as apprehended) only a combination of resistances; movement is the generalization of a certain order of resistances; and resistance is also the substance of force."[3]

Taken alone the muscular sensations give us little knowledge. We know from them the location and movements of larger or smaller masses of the body; but even this knowledge is very vague, since without touch and sight

[1] On the importance of feelings of resistance see Spencer, *Psychology*, ii chap. xvii.

[2] For greater detail on the mechanism of the muscular sense see my *Handbook of Psychology*, vol. i. chap. vii. § 3, with the references also at the end of vol. ii. chap. iv.

[3] *Loc. cit.*

these movements cannot be well co-ordinated, nor their amounts estimated.

Nervous Sensations. Under this heading we have to consider the forms of sensibility shown by the nerves themselves; they are in so far strongly contrasted with the foregoing classes, since in the case of the organic, cutaneous, and muscular feelings, the nerve conducts the sensation from some other organ or part of the body.

In the first place, the nerves are capable of the most acute pain. And nervous pain seems to have a more positive and, in consequence, more agonizing character than pain from other kinds of tissue. A variety of feelings arise also from a nerve when it is subjected to pressure. If a small band of rubber be stretched around the upper arm, these sensations are brought into consciousness: namely, a *tingling* in the extremities, the peculiar sense of a limb's being "*asleep*," and finally *numbness*. The same class of sensations follow from the mechanical stimulus of the nerve trunks in the stumps of amputated limbs. Another series of sensations depend upon the condition of the nervous system as a whole. Among them may be mentioned nervous *shock*, *exaltation*, and *depression*. Then there are states of nervous hyperæsthesia, or *restlessness*, so-called "nervousness." Other conditions bring on feelings of *alarm*, danger, and anxiety.

Further, electrical stimulation of the nerves causes another series of feelings, what we may call *electrical sensations*: peculiar *tingling* in the organ, a *knocking* sensation, or longitudinal feeling of collision, such as the sensation in the elbows when a mild electrical stimulation passes through the arms. Further, electrical stimuli are capable of rapid summation, and give rise to the most excruciating pains.

Physiological Proof of Distinct Common Sensations. That these general divisions of common sensibility have, at least in part, a physiological differentiation is shown by

the possibility of destroying certain of them without impairing others. Under progressive anæmia, or loss of blood, they are lost in the order named—those named subsequently to any particular one remaining intact when that one and those named before it are destroyed—namely, delicacy or co-ordination of movement, delicacy of touch, pain, voluntary movement, electric feelings, muscular irritability.

From this general survey of sensation, in respect to quality, the distinction between affective and presentative elements in sensation is more clear. In each sense when the affective element is strong the presentative is faint. When a very bright light strikes the eye it produces a strong affective sensation, but vision is indistinct. On the contrary, when we read printed words they represent thought, but are only slightly affective. The case is the same with sound and touch.

§ 6. Quantity of Sensation: Psychophysics.

Weber's Law. By quantity is meant *intensity* or *mass*. Until quite recently it was considered impossible to measure intensities in sensation, from the fact that they are subjective entirely and we have no abiding internal measure to which to refer them. This difficulty has been partially overcome by establishing an external unit of measurement, and comparing sensations through it with one another. A relative measurement is in this way attained. This external standard is the quantity of stimulus agreed upon as producing a unit of sensation. The external excitation thus becomes the means of approach to the measurement of the internal fact. For example, if the sensation given by the weight of one gram on the back of the hand be taken as the unit of sensation for pressure, other sensations can be compared with it, in relation to

[1] The student may profitably consult Ribot's exposition of this topic, *German Psychology of To-day*, p. 134 ff.

their respective excitations. This procedure has actually been carried out in those of the senses most accessible to experiment and the following law formulated, known as *Weber's law: In order that any sensation may increase by quantities always equal, the excitation must be increased by a constant fraction of the excitation itself*; or, *the excitation must grow in geometrical progression* (1, 2, 4, 8) *in order that the sensation grow in arithmetical progression* (1, 2, 3, 4); or yet again, *the sensation varies as the logarithm of the excitation.*[1]

Besides its application to the regular sense perceptions, Weber's law applies, with the same limitations, to the estimation of linear distance and to the judgment of the flight of small portions of time. In order that I may judge a line twice as long as another it must be really more than twice

[1] Fechner. In arriving at this law it was necessary to show that the *smallest perceptible difference* between two sensations of the same sense requires a constant fractional increase of the smaller excitation. This has been shown with reasonable exactness for moderate degrees of intensity of sensations of sight ($\frac{1}{100}$), touch ($\frac{1}{3}$), and sound ($\frac{1}{3}$). In dealing with high intensities the proper working of the organ is deranged and the results vitiated, as with very bright lights. In the case of taste and smell the difficulties of isolating the sensation and measuring the amount of the stimulus have been almost insurmountable. Three distinct methods of arriving at the smallest perceptible difference of sensation are employed, all of which depend upon the subjective estimate of the person experimented with as to the equality of two stimuli, such as weights or lights. (See Ladd, *loc. cit.*, p. 364.)

The scale of sensation values has its zero or vanishing point at the *smallest perceptible sensation* for each of the senses. Hence the necessity of instituting another series of experiments on all the senses to discover this value. The point at which a growing excitation first begins to be felt as a sensation is called the *threshold value* of the excitation and the sensation is said to be at the threshold. This point varies very greatly according to the conditions of the senses as to exhaustion, and the state of the mind, as preoccupied or attentive.

Upon these two classes of data, smallest perceptible difference of sensations and smallest perceptible sensation, the logarithmic law of

as long; and in estimating five seconds I make the time too short by about one-fourth.[1]

The interpretation of Weber's law has occasioned much discussion. How are we to construe the fact that the sensation, which must be considered as effect, does not increase proportionally to the stimulus, which is cause? The answer probably is that the disproportion is due to the loss of excitation energy in the physiological processes involved, the processes of transmission by the nerves and of central stimulation. This makes the central process the cause of the sensation, instead of the peripheral process, and the law of causation holds.

Extensive or Massive Sensations. The quantity of sensation, considered as *intensity* or *intensive mass*, is to be distinguished from its quantity considered as *extensity* or *extensive massiveness*. If I paste one postage stamp on my hand and then another beside it, the sensation is increased in the second case in extensive massiveness, but not in intensity. This distinction in quantity is possible only when there are coexistent sensations of the same sense which do not coalesce to produce a higher intensity. It seems to depend upon an extensive organ of stimulation, skin, retina, which is stimulated over a more or less extended area. It is experienced in putting the hand in

Fechner is based. Assuming that the differences of sensation to be barely perceived are infinitesimal quantities, and that the difference in the excitation is also infinitely small, as compared with the whole stimulus, we may, by the calculus, equate differentials and write (making ds increment of sensation, de increment of excitation, and k the proportional constant)

$$ds = k\frac{de}{e},$$

whence, by integration, $s = k \log e$;

or, the sensation varies as the logarithm of the excitation. The threshold value then being given, the scale is built up.

[1] This can be readily shown by counting seconds with the eyes on the second-hand of a watch, and then attempting to repeat it with the eyes closed. Below one second the time is judged too long.

water, or in hearing, at the same time, a continued musical note and a harsh noise. The difference between the two kinds of increase in sensation is distinct enough to require separate mention. That it is found equally in connection with some of the non-spatial senses,[1] however, seems to be sufficient proof that it is not an immediate datum of space-knowledge, as some would have it. It is probable that distinctions of extensity are as fundamental as those of intensity, and that they represent one of the first reactions of consciousness upon a nervous arrangement which has been perfected through former race development and inheritance.

§ 7. Duration of Sensation and Thought: Psychometry.

Since the discoveries of Helmholtz and others, as to the velocity of nerve transmission, it has become possible to arrive at a determination of the time necessary for different sensations and for some of the simpler apperceptive processes.

I. Beginning with simple sensation the case is briefly this: let the skin of a man in normal conditions be pricked and let him speak as soon as the pain is felt, or let a word be spoken and let the subject press a button as soon as he hears it. The period that elapses between the two events, in any such experiment arranged for two senses, is called the *simple reaction time* and varies from $\frac{1}{5}$ to $\frac{1}{7}$ second, according to the individual and according to the conditions of the experiment.

Upon consideration, it is readily seen that this period may be divided into three parts: first, the stimulation of the sense organ and sensor nerve transmission to the brain center; second, the mental process of sensation, discrimination, and volition, etc.; and third, motor transmission and stimulation of the organ moved. Now since the veloc-

[1] Stumpf finds original extensity in sound-tones.

ity in both the motor and sensor nerves is known, we reach by subtraction the time of the mental act. Instruments are used by means of which differences to the ten-thousandth of a second are noted. By this analysis of the simple reaction time we arrive at two general principles:

a. The simplest mental act occupies an appreciable period of time.

b. The purely physiological or transmission time is less than half of the entire reaction.[1] Consequently the time taken up by the sensation and motor impulse varies slightly either way from $\frac{1}{10}$ second. This cannot be called purely mental time, however, for the central physical change goes on at the same time.

An easy way to get an approximate value for the simple reaction is to request a class of students to stand in line, each grasping hands in turn with his neighbor. When the line is complete let an outsider give a signal "now" at a given position of the second-hand of his watch. At the signal the student first in line presses the hand of the next, and so on, as rapidly as possible, down the line, the last student calling "now" the instant his hand is pressed. At this second "now" the outsider again notes his watch. Now if the entire number of seconds elapsed be divided by the number in line plus two (the outsider reacts twice), the result will be the reaction time for one student.

II. Passing from sensation to the reproduction of ideas as memory pictures, it is concluded from experiments conducted similarly:

a. The time occupied in the reproduction of a state of consciousness is longer than the time of its production.

b. The time of reproduction depends inversely upon the degree of attention given (1) *to the original sensation,* (2) *to the reproduction.*

[1] This was conjectured by Darwin from the fact that we wink the eyes without having a change of sensation from light to darkness — *Zoonomia*, I. p. 64.

III. A third operation on which many experiments have been made is that of *distinction* or discrimination. To experiment upon sight, let two colored lights be shown, the subject understanding that he is to react by speaking or pressing a button only when he sees the color agreed upon beforehand. This involves first a comparison and then a judgment, with volition. The entire time is found to be about $\frac{1}{4}$ to $\frac{1}{3}$ second. By an easy process the purely physiological time is eliminated, and the duration of the mental act is found to be $\frac{1}{25}$ second (Kries) to $\frac{1}{20}$ second (Wundt). The discrimination is easier when the sensation is of high intensity; and since, in all reactions, the signal must be discriminated from other sensations in consciousness, we have the principle that *within certain limits the duration varies inversely as the strength of the stimulus.*

IV. Experiment has rendered service, also, in defining and confirming the laws of association. The time of a simple association is found to be $\frac{3}{4}$ second to $\frac{1}{2}$ second. Repetition greatly shortens the time by strengthening the association.

V. A fifth class of experiments relates to the logical judgment of subordination, *i. e.*, from genus to species. It is found that the time is longest when the subject is abstract and the predicate a more general notion (man is intelligent), shortest when the subject is concrete and the predicate a less general notion (the house is red). The average of a great number of experiments gives the time about one second. This is important as illustrating the growth of the general and abstract notion from the concrete, and indicates that the order of instruction of children should be the same.

It should be said that these results, which are not intended here to be exhaustive, are true only in an average sense and under normal conditions; and further, that they represent only a single type of our everyday mental processes, that of more or less concentrated attention and expectation. The fact that the subject of the

experiment must take part in the arrangements and concert his actions with those of others makes it impossible to obtain results without the attention. In life, however, most of our actions are not foreseen, and our attention is drawn to sensations by their occurrence, not beforehand. The degree of attention, however, may be somewhat varied and the results noted. The bodily states also greatly influence the duration of mental acts. Fatigue and other unusual physical conditions tend to lengthen the reaction time. The senses with which the most exact results have been obtained are sight, hearing, and touch, the most presentative senses: with taste and smell the mechanical difficulties are very great. In dreams, the ascertained durations do not seem to hold, since the flow of presentations then takes on, in many cases, enormous rapidity.[1]

Effect of Attention upon the Duration and Quantity of Sensation. We have already noted the general law that attention increases the intensity of sensations. It is at once seen that this principle interferes with the application of Weber's law, since a given stimulus is felt more strongly if attended to than otherwise: so that in comparing sensations by their excitations it is necessary to keep the attention constant in the two cases. The effects of attention upon the duration of sensations is even more marked. In general, *attention diminishes the time necessary for the reaction.* The shortest times are obtained by concentrating the attention. To such an extent may this give rise to expectation of the excitation that it is sometimes anticipated, the reaction of the hand, for example, being given before the signal is made. In the hypnotic state, where the attention is strongly fixed, the time is shortened. This con-

[1] For attempts to determine the perception, apperception, and will time separately, see references given by Ladd, *Elements of Physiological Psychology*, chap. viii. Other accessible *résumés* are Ribot, *German Psychology of To-day*, p. 260 ff., and Jastrow, *Time Relations of Mental Phenomena.*

centration is especially necessary at first, before the muscular reaction becomes automatic, for practice shortens the reaction time.

Further, according as the attention is given to the expected stimulus (touch, sound, etc.) or to the reacting organ (finger, in pressing a button, etc.), we have important variations in the time. In the former case the reaction is called *sensory*, in the latter case *motor*. In the "sensory" form of reaction the time is about one-half longer than in the "motor" form.

Effect of Duration upon the Intensity of Sensation. Within short periods the intensity of a sensation is diminished if its stimulus be continued. This arises from the accommodation of the organ to the stimulus. It applies especially to slight pleasurable or painful stimuli. Long continued stimulation, however, from exhaustion of the organ, becomes increasingly intense and painful; and sensations at first pleasurable become painful under this condition.

§ 6. Tone of Sensation.

By the "hedonic tone" of sensation is meant the feeling of pleasure or pain which accompanies it. It represents somewhat in all sensations, and in the higher senses almost entirely, the affective element. Pleasure and pain are only and wholly affective. Our whole sensational experience is accompanied by pleasure and pain and so has tone.[1]

[1] For detailed treatment see below, chap. xvii.

CHAPTER IX.

PERCEPTION.

§ 1. Definition of Perception.

The theory of perception is perhaps the most important as well as the most difficult problem of psychology. The interpretation of the higher processes of mind rests upon it and it underlies the body of our general philosophy. The great philosophies of the world take their rise from initial differences in the method of construing perception. Leaving the general problems of the theory of knowledge to metaphysics, we have to do only with the process of perception, considered as an operation of mind in attaining knowledge of the external world. That is, we have to answer the simple question, "How do we arrive at the knowledge of individual objects localized in space and time?" In view of the terms of this question and of the analysis which follows, we may define perception in a general way.

Perception is the apperceptive or synthetic process of mind whereby the data of sensation take on the forms of representation in space and time: or, considered more with reference to things external to us, it is *the process of the construction of our representation of the external world.*

§ 2. Analysis of Perception.

A little reflection leads to the conclusion that our perception of the external world is a matter of mental construction. All advance into the region of mind must be through mental states. The characteristic of mind is consciousness, and nothing can enter the domain of mind except through the mediation of consciousness. This is seen in the fact that our images play in consciousness in such a way as

sometimes to deceive us in regard to the external world. When the eye is deranged the mind is deceived in regard to colors and distances. When we have a cold our taste is impaired. When the hand is amputated irritation of the nerve ends is still localized in the hand. This amounts to saying that the mental picture which in every case is necessary to the perception of the object, is impaired or dissipated. The nervous system also intervenes between the mind and the world, and the proper activity of mind in representation depends upon the normal functioning of this system. This fact, that the mind deals with its images primarily and with external realities only through these images, is best seen when we consider that all mental states are modifications of consciousness itself, and that the perception of the external world, however real that world be, with its conditions of space and time, is possible only by some process of mind whereby these conditions can be mentally reconstructed and the intensive data of experience cast in the forms of this reconstruction.

It is the business of a theory of perception also to tell how we come to have the presentative or knowledge element pointed out in sensation. Space, time, force, etc., were recognized as such elements; in perception we find the process by which sensations come to take on these forms.

The construction of the representation of the external world has three stages which we may call, respectively, *Differentiation*, *Localization*, and *Sense-Intuition*.

§ 3. Differentiation.

The beginning of all life experience is probably, as has been already said, a state of general undifferentiated feeling. This state of things has been described briefly in the section on the growth of consciousness. There are, at this beginning of sensation, no distinct forms for the different senses, no notion of externality, no perception either of one's own body or of things. It is easy to imagine one's

self in that condition. All physical feeling is then vague, like the internal sensations which we cannot localize nor trace to their causes. It is probable that the muscular sense, with touch, constitutes almost the whole of this experience. The earliest transition from this state of general sensation is also probably due to touch and the muscular sense, through differences of intensity in feelings of resistance, and through the sense of locality in the body. The special organs of the other senses are more complex and must be adapted to their function of reporting impressions from without. Yet no step toward a real differentiation of sensations can take place till a reaction of consciousness is possible in the shape of attention. As has been seen, definite sensations as such are not distinguished without attention. At first this attention is reflex. But by it the unordered and chaotic mass of sensation, which is thrown upon the helpless individual, is divided, and distinguished. As this differentiation proceeds, each sense becomes a distinct source of affective experience, somewhat in the following order of development: muscular sense, touch, temperature, light, sound, taste, smell, color. The mere fact of differentiation, however, can give us no sense of difference between our own body and a foreign body. This distinction can arise only after we begin to localize our states; and even then all these states are located first in the bodily organs.

§ 4. Localization.

Another aspect of the synthesis which is called perception is localization. By this is meant the mental reference of sensations to a locality in space. "Things," as we perceive them, are always in space. Here is a new idea or form, of which, in the purely intensive character that sensation at first presents, we find no intimation. Whence does it arise, and to what factor in the perceiving process is it due? This is the question of the origin of the idea of space: one of the problems most discussed in general philosophy,

and one to which contemporary psychology is fully alive. With the further metaphysical question, What is space? we are not concerned.

The Perception of Space. It is generally agreed by psychologists that our first experiences of space are connected with the muscular and touch sensations of our own body. As has been said, the sensory content, before all differentiation, is largely muscular. The beginnings of differentiation seem at once to implicate the extensive or massive quality of sensation. There is a vague feeling of whereness in this early muscular sensation, and it becomes more definite as the extensive or spread-out sensations from the skin become broken up in localities. But at this beginning of space experience the question confronts us: How can excitations of the skin and muscles, which are transmitted in the form of molecular action through the nerve substance, and which have thereby lost their local coloring, report their locality to the subject? and further, how, if they preserve this local coloring in such a way as to present specific differences of motion at the central bureau, can these differences be reported to the mind, which is a conscious presence, not itself spread out in space?

There is only one answer which does not either beg the question at issue or overlook some one of its essential conditions; *i.e.*, *The mind has a native and original capacity of reacting, when certain physiological data are present, in such a way that the objects which serve to stimulate it appear under the form of space.*

Data for the Perception of Space. In the perception of space relations by the muscular sense, touch, and sight, the three senses through which it is accomplished, two classes of data seem to be involved. These data are of a physical kind and serve as basis for the mental reaction just spoken of. They are *muscular movements* and *local signs*.

I. *Muscular Movement.* Under the discussion of the

muscular sense, the twofold nature of the sensations involved was spoken of. Sensations of "effort" were distinguished from sensations of "resistance." Both of these seem necessary to the finished feeling of movement, though feelings of resistance play a predominating rôle. We learn from pathological cases that if the feeling of resistance be destroyed, a limb may be moved voluntarily, but there may be no knowledge of the actual movement and, consequently, no indication of space position. But, on the other hand, the movement of a limb mechanically is felt as movement when there is no voluntary motor discharge. Hence, whether we hold that space is a succession of resistances, or that space is an original element in the muscular experience, we still find the element of muscular resistance in our first sensations of locality. We see below that movement enters in the perception both of tactual and of visual space. Inasmuch as feelings of resistance involve touch as well as pure muscular experience, the second of our data, the *local sign*, is brought into play.

II. *Local Sign.* By local signs are meant specific local differences in the arrangement (Lotze) or structure (Wundt) of the elements in the skin. By reason of these differences localities partake in perception of the position they occupy in space. I refer an excitation to my hand or foot; why do I give it such a specific reference? Why do I locate a pain in my right hand rather than in my left? Simultaneous sensations of a purely intensive nature, as tastes, sounds, are fused together; but simultaneous sensations from neighboring points of the skin and retina preserve their peculiar character and relation to one another, and we distinguish different localities because the sensations from them are really different. As has been said, the first idea of our own body results from muscular sensations which arise from early movements, and these sensations are vague and confused; yet even here the feeling of extension is present, also vague and confused. Whence comes it? It

can only come from initial differences of some kind which are perpetuated through transmission to the brain. These differences, probably in the skin or sensor nerves, and possibly a matter largely of association, afford a second datum for the localization of sensations in different portions of the body.

The theory of local signs was first propounded by Lotze, who, however, varied it in its application to different orders of sensation. For sight he made the local sign consist in the fixed amount of muscular movement which any retinal point must undergo to be brought into the line of clearest vision. This is a different and definite quantity for every point in the retina. In the skin the local sign, for Lotze, was the combination of light accessory sensations which are provoked in immediate connection with the point of contact. There would be a varying amount of radiation of stimulus in the skin according to the varying structural consistency of the parts over which the skin is stretched, as bone, muscle, ligament. This hypothesis found development in the more natural position that the local sign was an implanted peculiarity in the structure of the skin itself. A further theory, very widely adopted, and suggested by Czermak, makes the local distinctions in the skin due to the ramifications of the spread-out nerve fibrils, each such nerve end reacting for its own position and being thus a local sign. This position is most probable. It is supported by the fact already cited, that the sensibility of the skin to local differences varies greatly in different parts of the body, and may be increased by the fixing of the attention, by exercise, and in the hypnotic state. These latter conditions tend to bring into play finer elements of the ramifying nerve, and thus to diminish the distance between the sensitive points. And the same facts tend to refute the theory that the units of tactual feeling are found in Weber's "circles of sensation."[1]

[1] On the general theory of local signs see Ribot, *German Psychology of To-day*, chaps. iii. and iv.

Besides the general consideration that some such hypothesis as that of local signs is necessary to the case, there is direct evidence of the existence of these signs. The fact of varying local discrimination in the skin has been mentioned; it is also true of the retina. The relative discrimination of localities grows less delicate as we proceed from the center to the edge of the retina. The quality of massiveness or extensity of sensations of touch and sight depends upon the simultaneous independent excitation of units of sensation, and can be accounted for only on the assumption of some characteristic by which these units are kept distinct. If the skin of the forehead be bent down upon the nose and grow there, its irritation is felt still at the forehead. The same is seen in the retina in certain pathological affections, in which the retinal elements are displaced: the irritating points of light falling upon these elements are localized where they would be seen by the healthy eye.

Synthesis of Data. But the fact of local signs, taken in connection with muscular sensations, is not sufficient to account for the perception of space. Whatever these signs be, the local color or tone they give is a modification in quality alone, or an intensive change in the sensation in question, and there still remains the necessity for a mental reaction whereby this intensive sensation, modification, or sign is construed in extensive form. How can we infer differences of external position from differences in our feelings? Let a sensation of red be modified in any way whatever as to its redness, and we are still absolutely in the dark as to its location on the right hand or the left. Nor would any number of partial sensations which I discriminate in it, nor the order of these partial sensations in coming to me, tell me that the colored object was "round like an orange or a ball." Admitting the concomitant sensations of Lotze, one of two things must be true: either these concomitant sensations co-ordinate themselves in space

in virtue of their own quality or they do not. If they do thus co-ordinate themselves, why could not the original sensations co-ordinate themselves? If they do not thus co-ordinate themselves, what help are they to us in this co-ordination? They must be only data by which the co-ordinating activity of mind proceeds in the matter of space perception.

Tactual Perception of Space. Upon this basis the mental reconstruction of spatial position proceeds in the case of touch. Locality in the skin being thus given, its definition becomes very exact in experience. Feelings at first vaguely localised are given precise spatial position. This is rendered easy by the exploring power of active touch. If left to passive touch from external objects it is unlikely that we would ever arrive at a clear conception of the extent and form of our own bodies. But by free movement of the hands, with active touch, the relative parts are explored. This is evident from the fact that localisation is most exact in the parts of the body most open to active touch and freest in movement, as the hand, arm, tongue, as contrasted with the back and cheeks. This process is also aided by our larger movements and their reversal, and takes place with rapid advance in early childhood.

Visual Perception of Space. As has been already intimated, the same data enter into the visual perception of space, muscular movement, and local sign. The evidence of the presence of local signs in the retina has also been adduced. Ever since the time of Berkeley[1] it has been generally admitted that the original perception of the eye is of a colored surface only: that is, that the eye has no immediate perception of depth or distance. This is shown most decisively by cases in which sight has been restored to those who were born blind. About a dozen cases of the removal of congenital cataract from the eyes

[1] Berkeley, *Theory of Vision.*

of persons of some age are on record, the oldest and most famous being the Cheselden case.[1] In each of these cases the evidence is very clear. When sight is restored the patient sees everything in the same plane; there is no distance, no relief, nothing but a colored surface, and this surface seems to be near the globe of the eye. The blind man on whom Cheselden operated said that objects touched his eye. Home's patient said the same of the sun and of the head of the physician. The patients of Nunnely and Franz had the same experience.

The muscular movements of the eye are of extreme delicacy and variety. There is for every point of the retina a fixed amount and direction of movement necessary to substitute for it the center of clearest vision; and when such a point, right, left, above, below, is excited there is at once a tendency to revolve the ball of the eye in such a way as to bring the center of vision to this point. This represents a given degree of central nervous discharge to bring about the muscular strain. Since movement of the eyes precedes vision, there are no means whereby such movement can be ruled out; and further, the influence it exerts in localization is seen in the fact that if one of the muscles of the eye be destroyed, so that no movement follows its stimulation, objects are localized as if this movement had taken place.[2]

The necessity for a reaction of consciousness upon these data is the same as in the case of touch. Sensations from

[1] See details of Cheselden and other cases in McCosh's *Psychology*, vol. i, p. 48.

[2] See references given by Wundt, *Phys. Psych.*, 2d ed., ii p. 81, and i p. 378. "For instance, one suffering from paresis of the right external muscle of the eye, so that the muscle is able by the utmost effort to effect a lateral movement of 30°, locates an object which in reality is only 20° distant from the median plane, at a point as far outward as corresponds to the utmost outward movement of the normal eye, and when asked to touch the object places his finger far beyond it to the right."

the extended surface of the retina and from its movements over the visual field can be only intensive and qualitative modifications of consciousness, which are apprehended under space-form by the mind's own reconstruction. The process in this case is the same as in touch with the muscular sense.

Spatial perception by touch and the muscular sense precedes spatial perception by sight. The idea, as a mental acquisition, is probably gained roughly before we see at all. But this does not impair the fact of spatial perception by sight. Having the idea of space, why do we clothe the data of sight with this form, and why do we not thus clothe the sensations to which we do not assign a spatial arrangement? Evidently because sight offers also the data which are necessary for the mental reconstruction of space.

Perception of Foreign Body. The distinction between our own and a foreign body arises very early in child life and is not subsequent to the completed idea of our own body. As we have seen, the perception of our own body as extended involves both distance or movement, and resistance. In the primary feeling of resistance we have the beginning of the perception of foreign body. The amount of movement or distance, measured in muscular sensation, indicates roughly, at first, but with great precision later, the localities of objects around us in reference to our own body. This is greatly aided by active touch and by sight. We feel round a body and give it the third dimension, which we have already found to be an attribute of our own body. The distinction between our own members and other objects is further assisted by the phenomenon of double touch; that is, the two sensations of touching and being touched, when we come in contact with our own skin. In paralysis our own limbs are to us as foreign bodies, inasmuch as the sensation of active touch is present alone. Another important series of double sensations arises when the child sees and also feels his own movements. Another important fact is that we both see and feel our own movements, while we only see other movements.

Visual Perception of Distance. The visual perception of distance or depth proceeds upon the tactual and muscular perception of distance. It consists in the acquired interpretation of light and color differences in terms of distance already given by the skin and muscles. The original colored surface presented in vision is projected more or less distantly, according as its lights and shades are associated with a greater or less muscular or tactual coefficient. This is seen in the fact that the original errors of sight, in respect to distance, are rectified by touch and muscular movement. In the Trinchinetti case the patient at first "attempted to grasp an orange with her hand very near the eye; then, perceiving her error, stretched out her forefinger and pushed it in a straight line slowly until she reached her object." Other patients have done the same, when first restored to sight. This interpretation in terms of muscular and tactual feeling becomes, in later experience, a matter of the sensitiveness of the eye itself. Its own mechanism of movement and retinal reaction gives data by association for the perception of depth.

A number of factors enter in the mechanical adjustment of the eye to sight at different distances. Among them we may mention: *a.* A muscular strain when the object is near, due to the slight contraction of the pupil and the swelling of the anterior surface of the crystalline lens. This is called the sensation of accommodation. *b.* Difference in an object when seen near or far with both eyes. The difference in the angle of vision of the two eyes enables us to see parts of the sides and thickness of the object gazed at, and this datum of depth varies with the distance. *c.* Strain arising from the varying angle made by the lines of vision of the two eyes. When the object is near the eyes turn toward each other; this is known as the sensation of convergence. *d.* Dimness of outline of a distant object, or poor light, the retinal elements being but

feebly excited. e. Diminished size, fewer of the elements being excited. f. In addition there are more general considerations which aid our estimation of distance, such as the number of intervening objects, the known size of the object, and others.

The finer estimation of distance is a matter of cultivation and practice. Indications entirely lost to the ordinary observer are unconsciously taken into account by the sailor and artist; such as the length of shadows, the air perspective, and delicate discrimination of colors. All this is clearly a matter of acquired judgment, which may be improved to an endless degree almost by the exercise of trained attention and study. In pictorial art the process is reversed, the task of the artist being to interpret back upon a plane surface those data of the perception of depth which we all unconsciously proceed upon. So fixed do the associations of distance become that, while our own sense experiences were sufficient to convert our primitive sensations of color into a complex of objects about us, we need a teacher of the elements of perspective to enable us to revert again to the conditions of our original perception.

Localization of Sounds in Space. The position of sounding objects in space is roughly indicated by the ear, but this rough localization proceeds upon the previous perception of objects by touch and sight. It is only after the surrounding world is tolerably familiar and its sounds already associated with known objects, that the sensations of hearing are definitely placed. This localization by the ear involves distance and direction. The distance of sounding bodies is judged from the intensity of the sound, especially when the normal sound is well known. When the hearing is impaired sounds are located farther away. The sense of direction seems to arise from several causes, the principal of which is the relative strength of the sound in the two ears. The sounding body is located on the side on which the ear receives more sound waves. If a sound be made on

the median vertical line through the head—say above—it is not localised, but a slight variation on either side the line is at once detected. Consequently, we locate sounds as right and left, before and behind, much better than up and down. Again, there is a tendency to locate loud sounds in front, from the fact that more sound waves from that direction are collected by the external ear. Delicate sensations of touch and muscular movement also in the ear aid us in localising sounds, though to a much less degree than in the hearing of some animals whose ear muscles are largely developed.

Feeling of Equilibrium from the Ear. Recent investigations have shown that the feeling of equilibrium of the body in space is due in part, at least, to combined muscular and auricular sensations. The feeling of erectness arises from muscular strain in the limbs and trunk. The feeling of direction involves also the muscles of the eye. Feelings of the rotation and general position of the head in respect to the body are given by the semicircular canals of the ear. These canals are projected in the three dimensions of space to which they seem to have, respectively, a determinate relation.

Ideal Product of Localisation: Idea of Space. The idea of space, as thus treated, is acquired in concrete perception. Space, so far, has meant extension, considered as an attribute of objects extended. The finished idea of space, as a great void, is derived only by a process of abstraction to be considered later. From the perception of a body extended we pass to the conception of an extension or space which this body fills: we abstract the body and leave the space.[1]

§ 5. Sense-Intuition.

The third and last stage in the process of the perception of the external world may be called *Sense-Intuition*. In

[1] On theories of space-perception see my *Handbook of Psychology*, vol. i. chap viii. § 4.

the first of the three stages under which we found this process naturally taking place, *i. e.*, *Differentiation*, we saw the breaking up of the general and vague sensory content of the infant's consciousness into the discriminated sensations of the different senses; in the second, *i. e.*, *Localization*, these sensations have taken position in space; in the third, *i. e.*, *Sense-Intuition*, sensations are gathered together in the permanent units or wholes which we call "things" in our ordinary dealings with the world.

As illustrating the incompleteness of the perceptive process at the stage to which we have now advanced, we may imagine a consciousness holding a given number of well differentiated and localized sensations; say, a taste, a smell, etc., as in "psychic blindness." These have no connection among themselves at their first experience, although they are given the same locality and occur at about the same time. There is no reason that they should be thought of together, or that one should suggest the other. That is, there is no reason that the intuition *apple* should emerge. There is a further process by which this important lack is supplied, and sensations, until now isolated and disconnected, are thrown into permanent complexes or groups. In this further advance several necessary steps are apparent.

I. *Attention.* However sensations may be grouped in the passing panorama of consciousness, they have no lasting connection unless their coexistence is attended to. And not only so, but it is doubtful whether simple reflex attention would be sufficient for the grouping of sensations in a complex whole. It may at least be safely said that the arranging and co-ordinating power of voluntary attention greatly facilitates our earliest intuition of things. It is here that the relating or apperceiving function of active attention is most apparent. It will be seen in treating of memory that the degree and intensity of the power of retaining and reproducing presentations depends upon the degree of attention given to the original experience.

This is especially true of the relations in which these original presentations stand to one another. The touch, taste, color, smell, or any two or three of the qualities of the apple are experienced, for the first time, in immediate conjunction and, while merely a colligation of sensations, are attended to as such, and their coexistence pictured. At first the muscular and touch sensations, as localised, precede, and upon these the sensations of other senses are gradually linked.

II. *Association:* a principle by which presentations once experienced together tend to come up in memory in the same order and connection. By this principle the revival of one of the former sensations tends to arouse the others with which it was before experienced. In the further extension of our experience additional sensations are added to the associated group, as when we learn that an apple before known as spherical and red is also sweet and fragrant. Like associations in general, this grouping of sensations becomes fixed only by much repetition and with the help of many bodily movements. Thus the object in perception becomes clearly defined and distinguished from others, and the external world takes on its permanent form, as a whole of various "things" existing in relation to one another.

An additional fact, important to the permanent fixing and discrimination of percepts, is this, that we learn very early to name objects as we perceive them. This is a mental function to be considered later, and it need be noticed here only to remark that it is a great auxiliary to the lasting quality of our sense-intuitions. In the ordinary education of children, when their knowledge of language goes ahead of their experience of things, the names are ready beforehand and are applied, under instruction, to objects presented to them, with a number of qualities clearly pointed out. Thus the process of growth in the combination of qualities is greatly abbreviated. Teaching by object lessons is therefore justified psychologically as a

method, in that it leads the child to attach the right name to the right object, in the first place, and thus to avoid all tentative and mistaken efforts at discrimination.

Motor Intuition.[1] Muscular sensations gradually become grouped or integrated in a similar way. With wider use, a larger number of muscles are associated in the performance of a common movement. These motor intuitions take the form of ideal or pictured co-ordinations of movement, which become more and more sure and automatic as the muscles are exercised in groups after repeated effort. The early random movements of the child are thus worked up into the systematic co-ordinated muscular groups of the adult life, by gradual adaptation to the environment; for example, walking, piano playing.

§ 6. Reflection or Self-consciousness.

The highest form of consciousness is *self*-consciousness. The notion of self, like other notions, is a gradual growth. The vague feeling of the ego which the first affective experiences afford, the feeling of modification in the consciousness as the background or theater of presentation, and the recurrence of this feeling again and again in connection with objects new and old—and added to this the mass of more constant organic and vital sensation—all this is the beginning of the sense of personality or self. Its attributes of permanence, identity, and activity become more prominent with the development of will in connection with muscular effort, and with the establishment of the relation of subject and object which is finally a fundamental fact. By reflection is meant the turning in of the mind to itself as its own object. By the result of reflection is meant, therefore, the knowledge which the mind has of its own operations, recognised as its own. It is an advance on the simple awareness of consciousness, in which there is

[1] Compare Maudsley's discussion, *Physiology and Pathology of the Mind*, American edition, chap. viii.

no reference to self as different from its object. In reflection, this reference has distinct place, and the self is discovered through the act of attentive inspection, as having and exercising the characteristics of mind.

Ideal Product of Reflection: Idea of Self. Through reflection, therefore, the idea of self is attained and assumes its important place in the mental world. Round the self as a center the intellectual life plays. To it all possible forms of experience are referred. It brings coherence into the circuit of consciousness, by giving it a center of reference and a circumference of limitation to the individual.

REPRESENTATION.

MEMORY.

CHAPTER X.

RETENTION AND REPRODUCTION.[1]

OUR states of consciousness, as a general fact, are all liable to reproduction, recall, or revival. The original states of consciousness are designated *Presentations*, or *primary states*; and the corresponding revived states, to which they give rise, *Representations*, or *secondary states*.

§ 1. GENERAL NATURE OF MEMORY.

The capacity to be revived on suitable conditions extends to all states of consciousness. This revival is most vivid and facile for sensations of sight, touch, and sound, from the fact already noticed that these sensations are mostly presentative, having the forms of space and time. Objects seen are readily pictured when the eyes are closed, and sounds of tunes, and more especially of words, are reproduced with great ease. In reading a page we recall the sounds of the spoken words involuntarily; and, if it be a page of poetry, the rhythm and rhyme are caught by the quick revival of the words and measures in succession. Other sensations, as tastes and odors, are also capable of reproduction. The fact that we distinguish and classify them is sufficient proof of this. Their reproduction is more obscure from the fact that, being more affective, they cannot be pictured under the presentative forms of time

[1] Cf. my *Handbook of Psychology*, vol. I. chap. ix.

and space. But that these forms, and consequently memory pictures in general, are not essential to memory, is seen in the fact that pains and pleasures, and the emotions, which are purely affective states, are remembered with great distinctness; these states afford no data for our picturing faculty. According to Epicurus, the memory of past pleasure and the imagination of future pleasure are the principal source of our happiness. Sympathy depends upon the revival of our own pains and pleasures; for we cannot sympathize strongly in cases which our own experience does not cover. And finally, the acts of will are present in memory, giving, according to their nature, moral satisfaction or regret.

Strictly speaking, a distinction is to be drawn between states which are *revived* after having once disappeared from consciousness, and those which *persist* in consciousness a short period after the external stimulus has ceased to act. The latter is a mental after-image, somewhat like the physical after-image on the retina, already mentioned. Every percept clearly distinguished leaves its outline in consciousness for a very small period, and then fades rapidly away. In the case of a rapid succession of presentations there is a coexistence of elements and not a revival. This is the case, probably, with written and spoken words, tunes, rapid rhythm.

Proof that Presentation and Representation differ only in Degree or Intensity.[1] Several kinds of evidence may be adduced in support of the claim that presentation and representation are one and the same process.

I. *From Consciousness.* We are aware in consciousness of no peculiar marks of revived states by which to distinguish them from percepts, except that they are prevailingly of less intensity. In the conscious reproduction the conditions of the presentation are vaguely reproduced. The representation of a name, sound, the tic-tac of the

[1] Cf. Rabier, *Psychologie*, pp. 162–167.

pendulum, is referred to the ear. The image of an extended object is formed as extended in the field of vision. If we try to recall the taste of an orange we seem to have a kind of after-taste on the tongue. In recalling emotion the general conditions of our first experience of it are found with it in memory by the law of association. There is this difference between the train of presentations and that of representations, that the latter is accompanied by a feeling of familiarity and anticipation. But it is doubtful whether this feeling is present at the reproduction, unless it involve a measure of complexity which was also present in the original. This feeling is present in the perception, also, when by repetition an element of representation is involved in it. In the case of voluntary reproduction, it is true, there is the addition of an exercise of will, which is of great importance in affording us a means of distinguishing between the percept and its image; but this is not necessary to the reproduction more than to the original perception, since most of our memory pictures arise involuntarily.[1] It has its counterpart also in certain voluntary efforts of perception; as when we explore an unknown scene with the eye or feel over an unknown surface.

II. *Presentations and Representations have the same Physiological Antecedents and Effects.* The physiological antecedents of both primary and secondary mental states are spoken of later under the physical conditions of memory. It is sufficient to say, here, that the immediate antecedents, the brain processes, are the same in both cases. The remote antecedents of the percept—presence of an object, and stimulus of the sense—are wanting in the case of the revived image; but it is the immediate antecedent upon which the representation depends.

The physical consequences or effects are also the same. Müller says that the simple idea of a nauseous taste is some-

[1] This relation to will is given due recognition in a later connection, below, chap. xix, § 6.

times sufficient to produce sickness, the natural effect of the real sensation. The visual picture of a person who has once provoked our anger serves to produce it again with the same physical expression. Intense mental picturing of a primary color may so exhaust the retinal elements that the complementary color is seen when the eyes are opened. It is hard to think upon an energetic action without imitating it, just as in the original attention to the performance of it by others we had such a bodily tendency; and to have a word in mind is usually to form it with the organs of speech. Further, the simple thought of great cold makes one shiver. The thought of the drawing of a sharp knife over glass sets one's teeth on edge, as Darwin says Anyone who has attended a clinical operation knows how acute the suggested sensations of cutting are at first.

III. *Frequent Confusion between Presentation and Representation.* The strongest, indeed the decisive, proof that psychologically these two classes of states are really one is this: we frequently mistake one for the other. "The proof," said Reid, "that there is an essential difference of nature between these states is that we never confound a sensation, however feeble, with an image, or the contrary." This is simply an error of observation. We do often confound them, and several different cases of this confusion may be pointed out.

1. *When the intensity of the image is very great* This is the case in hallucinations and insanity. "Patients continually hear voices speaking to them, or about them, replying to their most secret thoughts, suggesting to them profane and obscene ideas, and advising and threatening them."[1] In these cases abnormal brain action gives the image the verisimilitude of a sensation and the distinction is completely lost. The same result may arise in normal life from simple force of imagination. Newton could bring before him, when in the dark, an image of the sun, with all the characteristics of reality, and Goethe could

[1] Maudsley, *loc cit.*

evoke an object and cause it to pass through a series of transformations.

Further, there are cases of regular mistake in our perceptions, in which an image passes for the real object. In reading rapidly we do not see all the letters individually, but pass over them with a supply of appropriate images. Proof readers know this from sad experience. It is probable that we see the first letters of the words and the last, slurring over the middle characters and supplying them from our knowledge and from the connection. Yet we think that each letter has been seen in order. The blind spot in the field of vision is filled in by the one-eyed man and the field seems to present an unbroken continuity. And our acquired perceptions are often imaged additions to our presentations and interpretations of them. In all these cases the image is of such intensity as to seem homogeneous with the presentational field which it supplements.

2. *When the actual sensation is very feeble.* The same result is found when the sensation is reduced in intensity to the similitude of the image. For example, when a sound dies out little by little the time comes when one is uncertain whether he still hears it or only remembers it. If the two experiences were distinct in nature the line between them would be very plain. Patients often cannot tell whether they feel a pain or only imagine it.

This is especially the case in states of hypnotic hallucination. Here a mere suggestion of the presence of an object suffices to place its image in the conscious field of the patient with a persistence and perceptive consistency which nothing but a counter-suggestion can remove. The image becomes for the patient an actual object for all the senses, the ordinary tests of illusion[1] fail, and there is absolutely no distinction to the subject between the image and the reality.

In all cases in which there is no actual perceptive experi-

[1] See chap. xiv, § 4.

ence to correct the force of images, we are liable to illusion, and hence the mere absence of percepts is often sufficient to cause the errors attributed above to the strengthening or weakening of sensation. This is the case in dreaming. The dream world is the only world then in consciousness, and though its intensity is probably feeble, as is seen in the fact that dreams do not linger generally in consciousness, it is taken for real, simply from the absence of anything more real wherewith to contrast it.

Definition of Memory. In considering the entire mental function which we call memory, we find that it involves several factors or stages, which are sometimes treated as distinct operations, but may more properly be considered, as we find them, together. Together they constitute a chain of events whereby the mental life of the past is retained and utilized in the present. First, there is the permanent possibility of the revival of a past experience when its first circumstances are repeated; this is called *Retention*. Next, there is the actual return of the image to consciousness: *Reproduction*. Third, this image is known as having already been presented in our past experience: *Recognition*. And finally, there is, in most cases, an immediate reference to the exact past time of its first experience: *Localization in time*. These, taken together, constitute a finished act of memory, and will be considered in the order of their actual rise in consciousness.

Accordingly, memory may be defined as a *mental revival of conscious experience*: in which the word experience refers to the past and suggests Retention; the term revival answers to Reproduction; and the word mental makes the whole a conscious feat of Recognition. This definition puts the case in the broadest light and admits any interpretation of the subordinate operations which may be consistent with fact.

§ 2. Retention.

It is seen, in the above analysis, that an act of memory touches consciousness at two points: at the beginning, *i. e.*, at the time of the original presentation, and at the end, *i. e.*, in the act of conscious revival. We remember nothing of which we were not conscious at the time of its occurrence, nor do we remember anything when we are in a state of unconsciousness. These two points of contact conceded, the question at once arises: what of the intervening period? I saw, for example, a house yesterday or last year; I was conscious of the presentation. I recall the image of the house to-day, or a year hence; I am conscious of the representation. But where has it been in the mean time, while I was not conscious of it? Several answers to this question have been proposed.

Theories of Retention. I. *Images, we are told by the metaphysicians,*[1] *are stored away in the mind*, in the pigeonholes of the soul, to be brought out for use when the processes of mind require them. This view, it is needless to say, is not now advocated in this language. The mind has no pigeon holes; it is not a storehouse of images. But it is maintained in more discriminating form by others who, very commendably, wish to maintain the continuity of mind over the chasm of forgetfulness which divides these two points of conscious life. Yet it seems sufficient answer to this to say that, if the image has left consciousness it has left the mind, as far as we know. It is only by consciousness that we can discover the image at all. This has greater force in view of the complete fulfillment of all the requirements of the case which we find in the theory advocated below.

II. *Retention is due to a psychological habit.* This theory refers retention to habit, and conceives of habit as a permanent disposition of the mind to do again, whenever

[1] See Hamilton on "Latent Images," *Metaphysics*, lect. xxx

circumstances permit, what it has once done—to think again what it has once thought. As a description of the actual fact this is true. There is such a tendency, to a very marked degree; but it is merely an observed aspect of memory, and, in noting it, we do not at all explain the activity of memory. When we have called it a habit, a disposition, a permanent tendency of mind, what more can we say? The questions arise: Is it based on psychological grounds, or will physiological facts explain it? Is it an ultimate law, or can it be reduced to simpler principles? Habits are not facts of consciousness, and we have no experience of them except by observation of the states which are supposed to exemplify them; so that they elude our observation. If it is submitted, therefore, as an explanation of retention that the mind becomes accustomed to acting in certain ways, and so repeats itself, the ground of this mental custom must be again referred to that chasm of the unconscious which affords so ready a repository for the outcasts of our ignorance.

As Volkmann remarks, moreover, inasmuch as the representations are not essences, but functions, the dispositions or habits of mind must be functional dispositions. Now a functional disposition can only consist in a slight persistence of the function, which, in turn, can only mean a con-[illegible]e of the representation in complete unconsciousness. By physical disposition or tendency we may mean combination or arrangement; a readiness of parts for a given result. But in speaking of presentations, as functions, we cannot employ such a meaning. Wundt himself remarks: "If we carry the view (of dispositions of mind) over from the physical to the mental, only conscious presentations can be considered real presentations, while those that are driven out of consciousness may be considered as mental dispositions *of an unknown kind* toward revival." And he goes on to say: "The essential difference between the spheres of the physical and mental consists in

this, that in the former case we may hope to learn more of the changes which we call dispositions, while on the mental side this hope is *forever forbidden*, inasmuch as the limits of consciousness are at the same time the limits of our inner experience." [1]

III. *The image is subconscious.* The school of Herbart support the theory that every image which is capable of being revived in consciousness exists in a state of diminished intensity, having fallen below the "threshold" of consciousness, to rise again when, for any reason, its intensity is heightened. This may mean that the representation is vaguely or dimly conscious, lying in a state of diffused attention, but still entering as a factor in the complex whole of our present state; in which case the theory is true, as far as those images are concerned which can be found, however dimly, in consciousness. But it then overlooks the great mass of newly recalled facts; facts which are in no sense even in subconsciousness, as my memory of a date in history when I am thinking of something to which it is quite foreign. As for these entirely unconscious states, the Herbartians have no alternative but to hold that they lie, with minimum intensity, in the depths of the psychic life. This is the old metaphysical theory in more modern guise. The phrase "unconscious presentation" may be more scientific and less material than "latent images" or "stored-up ideas," but it is equally obscure—and less picturesque.

Another pertinent objection to this theory is that it supposes a degree of separateness or individuality in these supposed unconscious states, which in real mental life is impossible. If representations coexist, with slight intensities, in unconscious mind, why do not those of the same quality coalesce, as in real presentation? I have a distinct memory of two notes, say *c* and *c'*; if they are both present in subconsciousness, differing only in intensity from

[1] *Phys. Psych.*, 2d ed., ii. p. 205.

the real sensations, why do they not coalesce in a single sound as real sounds do? So generally with these states; there is no interference or mutual hindrance, as in real experience.

General Criticism. As a general criticism of the preceding theories of retention, the following consideration is of great importance. They agree, especially the first and third, in regarding the representation or image as a thing of itself, a something which exists, and whose presence somewhere also must be supposed, when it is not present in consciousness. We are told the percept of the house was in consciousness yesterday and the representation will be again to-morrow; the image of the house must be somewhere to-day. And these theories attempt to conjecture the whereabouts of this image. Very slight consideration leads us to see that this manner of thought is quite mistaken. The image is not a thing at all, to be stored away or sunk in subconsciousness like a stone in a lake; it is a state, a mental product, dependent upon a process, and in the absence of this process it simply ceases to exist. The true answer to the question, as to where the presentation is in the time between percept and memory, is *Nowhere*. Its reinstatement is simply the reinstitution of the process which at first gave it rise. Its recall is a recreation, really a new presentation, not the old image. We never have the same representation twice. We are thus led to another theory.

IV. Physiological Theory of Retention. Disregarding the fact of actual reproduction, which is considered below, and looking only to the permanent possibility of such reproduction, that is, to the set of conditions of such a kind as to make the revival of mental states at any time real, we are led to the view that retention is physical, a matter of the modification of brain and nerve structure or function, such modification persisting and giving rise to a physiological habit or tendency. Before proceeding

farther to explain and defend this view some general objections may be met.

1. It is objected that physiological modifications could not last as retention does, even admitting the general principle that every organic modification must leave some trace behind it. Here the question is simply as to the length of an admitted process of obliteration. It is not held that these modifications do not fade away and finally disappear, as far as memory is concerned. The fact of forgetfulness, seemingly absolute, establishes the tendency of these traces to disappear. Therefore we only have to ask, how long, relatively, might they last? Admitting this point, we still find it possible to hold that these nervous modifications persist indefinitely, as memory sometimes appears to.[1] There are analogous cases of long persistence of physical modification. If a key be laid upon a white paper, and exposed to the sun, and the paper be then preserved in darkness, the image of the key is visible for some years. Even in case of organic modification where the physical elements are undergoing perpetual renewal, the form persists. An insignificant scar on the skin remains through life. The virus of smallpox, or the presence once of an infectious disease, leaves marks sometimes, throughout the elements of the body, which are never erased. Muscular fiber is permanently modified by exercise. We have a further analogy in the permanent disposition which the motor centers assume for the co-ordination of movements. At first complex movements are performed with great difficulty, the central nervous disposition being wanting; but after some practice these dispositions become established and the co-ordinated movements become semi-automatic. Of the

[1] See Ribot, *Les Maladies de la Mémoire*, chap. iv., and Taine, *Intelligence*, ii. chap. ii., for remarkable cases of such memory. An ignorant girl, during a severe illness in her twenty-fifth year, recited long pieces of Greek, Latin, and Hebrew, which she had heard her uncle repeat when she was nine years old.

superior centers the same, in all probability, may be said. Furthermore, hypnotic experiments show beyond question that experiences absolutely beyond recall in the normal life may come readily back to the hypnotic somnambulist.

2. It is further objected that the brain does not afford sufficient substance or accommodation for so many co-existing memories, supposing them to be permanent traces, either in the organism or its functions. But this difficulty, although frequently urged, does not deserve serious thought. According to the most moderate estimate, the large brain contains about 600,000,000 cells and even a larger number of fibers. And we are not at all obliged to think of these elements as having a single function only. They are known, on the contrary, to act together in specific connections, and the varieties of connections of so many elements is simply infinite. Further, we have here, also, analogous cases which settle the question without further consideration: the coexistence of innumerable functional dispositions in the motor arrangement of the nerves and muscles of a single organ of the body; the marvelous fact of the life development of an organism incased in a single germ, at first microscopic—a germ which possesses, in disposition or tendency, all the organic characteristics of the parents to the most minute detail, as the color of hair, shape of face, and those indescribable similarities of feature which constitute family resemblance, or the disposition to peculiar motor habits.[1] If a single germ cell may possess such inexplicable power of preserving differences of form and function, what limit can we set to the similar power of the brain?

3. It is again objected that the reduction of retention to a physical tendency and modification interferes with mental continuity and destroys the unity of mind. This, however, is seen not to be the case, when we remember that we

[1] See the case of three generations having the habit of striking the nose with the fist while asleep, Paulhan, *Physiologie de l'Esprit*, p. 154.

are dealing with the retention of individual states or presentations, whose lapse from consciousness does not affect the unity and continued persistence of consciousness itself. If a presentation be quite out of consciousness it is lost to the mental life, whatever be our theory of its fate—whether it be in unconsciousness, weak consciousness, or in physical disposition. The unity of consciousness, the conscious active unity of apperception, remains present throughout all the come and go of states, some other presentation taking the place of that which is lapsed; or, in other words, another content occupying the active process. The unity of the mental life consists, not in the persistence of single states, but in the conscious oneness of the ego as voluntary activity.[1]

Physical Basis of Memory. As to the nature of the physical basis, which constitutes the primary condition of retention, we may speak in general outline. In the case of any sensation and its reaction in movement, two classes of physical data are involved: sensor and motor. The sensation has its seat in the gray matter of the brain, from which, by a fibrous connection, and through certain motor elements in the brain or spinal cord, communication is established with the muscular tissue. Each such system of connected or associated elements is called a *sensori-motor circuit.* Now every sensation, say that arising from a bell, gives two kinds of modifications in the nervous system: first, it works an unknown change in the sensor cells, and second, it tends to establish motor connections. Accepting this as the simplest type of such action, we can conceive of innumerable modifications and complications of it. Numerous motor connections may be possible from a single seat of sensor change. For example, upon feeling a painful contact with the body, we have numerous alternative movements to relieve it. When a limb is fatigued we may move

[1] See the section on "Mental Unity" in my *Handbook of Psychology,* vol. ii. chap. ii. § 6.

it into various positions of change. When we hear a word we have a tendency both to speak and to write it, involving different motor connections, or we may make a gesture expressive of its meaning. In the same way, different sensory centers become connected with one another by their frequent association together: as the taste and color of an apple. Now every time the sense in question is excited by the same stimulus, the same course of transmission, by the law of least resistance, is liable to be called into play; and there is a tendency to confirm both the sensor modification and the sensori-motor circuit. Thus greater facility and rapidity are given to the process, and there arises in the nervous organism a readiness or disposition to repeat its own acts under similar circumstances.

Now in the case of reproduction, or memory, the same nerve elements are affected, and in the same manner; except that the sensor centers are excited from within instead of from without: from some other center instead of from the end organ. For example, if instead of hearing the striking of the bell I am thinking of architecture, then of the cathedral at Thun, the bells of Thun arise to mind, and I have a memory of the sound of a bell. This, by an established association, excites, entirely from within, the center of vision, giving a visual image of a bell; this excites the motor-connection with the organs of speech, and I pronounce the word bell. Thus the same elements are brought into play as in the actual presentations by the senses involved—the bell itself being absent. This is the physical basis of a memory. The organism is disposed toward the revival of the state of consciousness of the original perception. The execution of movements, at first difficult, becomes easy, then semi-automatic, and often irresistible, and nothing remains to make the physical retention real reproduction, save the mental conditions which inaugurate its movement. In memory, the connection is *ideo-motor*.

Mental Conditions of Retention. The mental condi-

tions of retention are the essential thing—not the retention itself, which we have found to be a matter of the physical organism. First we note the *intensity* of the sensation. Sensations or perceptions of slight intensity are not remembered; this is because they do not reach the relating and fixing activity of apperception. It is probable that they are retained as bodily modifications and have their influence upon the general cast of our memory, as is shown in their possible recall in the hypnotic state. But, not having been given a place and connection in the mental life, they have no associations of sufficient strength to accomplish their recall. Intense sensations, on the other hand, draw the attention to themselves and are remembered. Another condition, or facilitating circumstance, is *repetition* of the first sense-experience. Repetition tends to bring a presentation before the attention from the very fact that it is the same experience we have before met. A presentation which is at first too slight for notice and so escapes attention, at another time, and under different conditions, is apperceived and fixed in an escort of conscious states. In many cases, also, the very fact of repetition serves to add actual strength to the presentation, proceeding upon the nervous modification or tendency begotten of its earlier occurrence.

The most important of these conditions, however, and that to which those mentioned may be subordinated, is the *attention*. The attention considered in its entire function as the apperceptive agent of our mental life is, as shall be seen later, the one essential mental condition of memory. Here we deal only with its bearing on retention. It is a universal principle that things attended to are remembered, and things not attended to are forgotten. This arises from a twofold effect of attention: first, as was seen in the chapter on attention, it increases the intensity of presentations, and so gives them a greater strength and nearness in the flow of mental states; and, second, it gives them a

related position, as of contiguity, resemblance, cause, in reference to other states with which or near which they occur. We shall see, in studying association,[1] that our mental experiences are never isolated. They are always bound together by relations which the mind discerns in apperception. The more closely and definitely they are bound together the more permanent are our acquisitions; and the more loosely bound, the more easily dropped out and lost. Now apperception is this binding. When we say we experience a sight and attend to it we mean that we bring out its details in relation to one another and in relation to our earlier and later experience, giving them a place in the permanent texture of our memory.

§ a. Reproduction.

a Primary Condition The first condition of the reproduction of an image is the physiological disposition which appears to constitute retention. Assuming retention, therefore, we inquire into the further elements of reproduction. It is easy to see that this purely physical modification does not account for the revival of an image in consciousness. The essential element of memory is lacking. The simple fact that matter modified as you please does not remember serves to refute the theory of "organic memory." We might, with as much reason, say that the post remembers the nail which was driven into it, because it retains a permanent modification in the arrangement of its elements, or that the seasoned meerschaum pipe remembers by virtue of the molecular changes which its frequent use has wrought, as that the brain remembers because of its molecular dispositions. Of the physical process we may say: *a.* That it is the necessary basis of memory, as far as our experience goes. *b.* That it accounts for retention. *c* That it gives direction to the flow of our memories, by the determination of one of many alternative nervous courses. But it is no more an approach

[1] Chap. xii.

to an explanation of the revival in consciousness of an image than of the first perception itself. The physical process determines *what* I shall remember: the mental process, *that* I shall remember it. The primary condition, therefore, of reproduction is the reinstatement of the original presentation by a new apperceptive construction.

Supplementary Condition. It has already been made more or less clear that a reproduction is a recreation, a new product, which is due to the same conditions as the original perception, with the lack of the external stimulus. This lack is, however, seeming rather than real, since the central stimulus is as really supplied from within as though the object were present. Admitting, then, the physiological disposition of the organism, due to former experience, we find the further supplementary condition of reproduction to be *a new stimulus of the centers, arising generally from an inner or mental source.* This new stimulus, however, is not always mental, since there is a vast range of bodily conditions from which the centers may be excited, stimuli which may be called intra-organic in distinction both from the excitations of the external world and from those of the world of conscious states. Any stimulus which fulfills the one condition of reproducing the physical function, as it operated in perception—the mental conditions being again also present—suffices for the revival of a presentation.

This theory of reproduction explains many mysterious facts which are inexplicable on the theory of mental habit or of unconscious memory. The whole field of unconscious trains of ideas is covered by the consideration of an organic process. We are often surprised at the sudden appearance in consciousness of a representation which has no apparent connection with our train of thought.[1] Yet, by close attention, we can often find some dim association

[1] Cf. Hamilton, *Lect. on Metaphysics*, iv. and Mill, *Examination of Hamilton*, chap. xv.

with an earlier state. In consciousness we have forgotten the connection, but an organic disposition asserts itself through all the links of our earlier presentation, and the unexpected idea is the consequence. This is supported by the fact drawn from psychometry, that in many reactions the physiological process seems to take less time than the mental.[1] It is quite conceivable, therefore, that when a series of nervous modifications follow one another very quickly, sufficient time is not afforded between them for the conscious presentation. Often, also, after vain efforts to remember a date or name, we give it up, but when thinking of other things it suddenly pops up, so to speak, in consciousness. It is possible that in our casting about for the desired memory we have started a train of association which has run its course in the organic dispositions, and terminated successfully. These cases will be again referred to in the consideration of the association of ideas. This explanation seems much more natural than the mysterious hypothesis of unconscious mind.

The principle that the same physical process is involved in the reproduction as in the presentation is confirmed by the distinction above noted between a persistent presentation and its revived image. The persistent presentation is seen, at once, to depend upon the same excitation and nerve process which gave the percept; yet it remains when the object is withdrawn. Hence we have every reason to believe that the revived image is due to the same nerve process, since it differs from the persistent presentation only in its separation from the external stimulus by a very brief period of time. One is a prolongation of the primary state, the other a restoration of it; the former is the continuous effect of a continuous cause, the other the intermittent effect of an intermittent cause.

Secondary Aids to Reproduction. There are certain secondary conditions which tend to the most ready repro-

[1] See chap. viii. § 7.

duction of mental pictures. In their general nature they are almost identical with the auxiliary conditions of the actual perception of objects, and so add new evidence of the identity of the two classes of facts. Among them we may notice: *a. Intensity of the nervous stimulation.* All direct excitants of our nerve tissue, as coffee, opium, hasheesh, stimulate the reproduction of images and thus aid the memory temporarily. So also any occurrence that excites the nervous system as a whole, as a blow on the head, great danger, a threat of death.[1] *b. The absence or feeble intensity of present states of consciousness.* This tends to throw the attention upon the revived image, which is ordinarily feebler than the present presentation. For this reason we close our eyes when trying to remember something. *c.* As before, in the case of retention, *the attention is the principal aid to reproduction.* Representations must be attended to, to be apprehended at all, and after this, attention makes them still more distinct. Indirectly also, attention may be used to call up representations. We think of an object or event in some known relation to the one we wish to remember, and set a train of association going which secures to us the desired image. Often, however, the fixing of the attention may hinder the memory seriously, from the fact that it tends to hold an image before the mind to the exclusion of others and so impedes the flow of association. *d.* By *association*, finally, as is seen later,[2] the function of reproduction is given consistency and unity, and made available for the higher uses of mind.

Power of Imaging. The power of recalling mental pictures varies greatly with individuals and at different periods of life. Images of sight are most distinct and lasting and become our type of memory pictures in general;

[1] Hence, probably, the frequent, but not universal, experience of minute memory of past events when one is in danger, as of drowning; generally it is greatly overstated.

[2] Chap. xii.

they arise also and become fixed very early in child life. Persons who have this power to a marked degree are known as having good imaginations, though simple revival of images is the most rudimentary form of imagination. It may be a bane to the mental life rather than an advantage, as in the case of insistent and fixed ideas. In accordance with the principle of attention already noticed, the images of childhood are strongest in our memory. The attention at that period is not burdened with details, and trivial things are of great interest and importance; such images are also recalled so often in after years that repetition gives them great vividness and numberless associations. Many old people are constantly led back in conversation to their childhood, even when memory of middle life is failing. Galton has found the farther remarkable fact that a small proportion of persons have a peculiar mental scheme or diagram in consciousness in which they arrange numbers, colors, etc., when imaging them. "Number forms" and other such peculiarities seem to be innate and hereditary. Cases have long been known of individuals who attach particular colors to particular sounds, such as green, blue, etc., to certain letters of the alphabet. Grüber has recently reported "disparate associations" of this kind between sight and taste, sight and smell, sound and taste, etc. He even finds in one subject certain tastes accompanying degrees of muscular exertion, and colors attaching to temperature sensations.[1]

Retention and Reproduction as Mental Growth. The growth of the mind through accumulated experience is a matter of individual appreciation. There is a constant enlargement of view and strength of purpose due to

[1] For a typical "Number Form" see my *Handbook of Psychology*, vol. ii. appendix C; also a variety of them in Galton's *Inquiries into Human Faculty*. On the other peculiar facts mentioned see also his discussions on "Mental Imagery" and "Color Associations" in the same book.

exercise. Every mental experience leaves the mind different, as every physical change leaves the body different. There is a progressive development of self-hood—a realization of mental possibility in the form of actual life, which gives individuality to the man and colors his disposition. In this sense all experience is retained mentally, retained in the altered possibilities which it opens up. Proceeding we shall find that mental habits appear stronger, perhaps, than physical, and such habits, dispositions, vague feelings of intellectual preference and aversion are the sum of all the elements, however minute, of our past.

CHAPTER XI.

RECOGNITION AND LOCALIZATION.[1]

§ 1. RECOGNITION.

RECOGNITION is the third stage reached in the development of memory. Granted an image reproduced, a representation, it is then recognized. Representations are "accompanied," says Locke, "with an additional perception (feeling) indicating that they are not new, that they have been before experienced. This is ordinarily called *recognition*." This additional fact of recognition, however, does not always accompany revived images, and by the study of the cases in which it is absent we are able to learn what recognition is.

Feeling of Familiarity. In a general view of recognition from the standpoint of common consciousness it consists in the feeling of familiarity with which an image or object affects us. We say feeling, since the recognition, in itself, accompanies the act of knowledge in which the object or image is again presented; that is, reproduction is assumed in recognition. This feeling of familiarity is vague and often misplaced, and ordinarily goes unanalyzed.

Distinction between Recognition of an Object and of an Image. The means by which recognition arises vary as the recognition is of an object or of an image. In the case of the second perception of an object its recognition is probably accomplished by means of an image which is already recognized. We have a comparison between the percept and the image, and feel them the same or

[1] Cf. my *Handbook of Psychology*, vol. i, chap. x.

similar. This is seen to be the case in frequent instances in everyday life. If we are asked whether an object is the same as one seen before, we often say we do not know, for we do not remember how the former object looked; which means that we are unable to call up and recognise any image with which the object present may be compared. In the case of the recognition of an image such a procedure is impossible. It would presuppose another image still, and so on indefinitely. The question, therefore, is narrowed down to the means by which we recognise a reproduced image.[1]

The recognition of an image depends upon the degree in which its apperceptive relations are re-established. It has already been seen that the reproduction of an image consists in the reinstatement of the conditions, physical or mental, of the original perception. Such a reinstatement of the conditions suffices to bring an image back into consciousness; but it is not then necessarily recognised. It is only when some of the mental connections—the relations established among the perceptual elements by apperceptive attention—are again more or less consciously presented that the sense of familiarity is felt. It is necessary that there be some accompanying conscious elements to which the recognised elements are related. Often when an image arises in consciousness we do not recognise it till we bring back some association with it. Often, also, we see a face and in so far recognise it as to feel vaguely familiar with it; while we strive to bring up more of its apperceptive connections in order fully to identify it. This first vague recognition is probably due to the felt beginnings of the revival of the spatial proportions of the face.

This is further proved by the fact that percepts which are not related in the first presentation—for example single isolated sensations, as the stroke of a bell—are not recog-

[1] On theories of recognition see my *Handbook of Psychology*, vol. i. chap. x. § 1.

nized in the representation. We say of such presentations that there is nothing distinguishing or characteristic about them whereby they should be recognized. But this is only to say that there were no specific points of connection between this image and others, or between the parts which are separately apperceived. As soon as some sign is made of a peculiar kind in connection with the image it is recognized. Recent experiments by Lehmann on the recognition of differences of color strikingly confirm this view. Different shades of gray, which could not be recognized when seen quite alone, were recognized when they were given names beforehand, or when a number was attached to each in the first perception. Of nine shades without names or numbers, only forty-six per cent. gave true recognitions; while the same shades, with numbers, gave seventy-five per cent. of correct identifications. Here the introduction of a simple *local relation* in the perception gave the necessary clew. The same appears in the experiment noted above;[1] my infant recognized her nurse after her absence only when several senses re-enforced one another. And further support is derived from the phenomenon of so called psychic blindness, deafness, etc., *i. e.*, recognition is absent in animals deprived of the higher co-ordinating brain centers.

This view of the case also enables us to take account of the subjective element of recognition, which is overlooked in other theories. There is more in recognition than the sense of familiarity with an image. There is the feeling of ourselves as in familiar circumstances. It is one's self who has been in this state before. This feeling of self develops largely, as we have seen, in connection with active attention. But attention is the organ of the process of apperception. Consequently when by reinstatement of this process the fact of recognition is experienced, it carries with it essentially the feeling of an emphasized self: the self of the first apperception is again evident in the self

[1] Above, chap. v. § 5.

of the reapperception, and the sense of sameness of the apperceptive content really arises with the sense of the sameness of the individual who has it. Recognition of the image, therefore, and sense of personal identity, both rest ultimately in differences in *the amount, ease, facility, good adjustment of the attention.*[1]

§ 2. Ideal Product of Recognition: Personal Identity.

In the foregoing discussion the origin of the idea of identity, in general, and the identity of self, becomes clear. In our feeling of personal identity it is not self apart from the events in consciousness of which we are conscious as persisting: it is the consciousness of something which abides in the midst of these events which constitutes this feeling. It rests, first, upon reproduction, since a single present experience does not afford the duration or time through which we feel ourselves to be the same. There must be reproduced images with which our present experience is compared. But further, these images must be recognised, and must carry with them that feeling of familiarity which is afforded in the reinstatement of the apperceptive process of attention. This activity is felt to be *my* activity in the second experience as in the first, and the recognition of the I takes place in virtue of this repeated activity.

§ 3. Localization in Time.

The question as to the origin of the idea of time must be approached, as in the similar problem of space, from the standpoint of concrete perception of filled time. Time in the abstract we do not know. We experience time only as we experience events, definite and individual, in time. We sometimes seem to apprehend the flow of pure time, as in the night we lie awake in silence, conscious of the vacancy of our minds; but even then this flow of time is

[1] Cf. below, chap. xix. § 4.

marked off by distinct events—the beating of the heart, the direction of attention to fragmentary sentences or words which flit over our consciousness and are looked at only to be dismissed.

The inquiry then seems to be as to the localization of events in time, as we have already considered the localization of things in space. There are two general characters of our notion of time which are ordinarily used in attempting to define the notion; namely, *duration* and *succession*. These correspond in the case of time, respectively, to length and position in the case of space.

The terms of the problem of localization in time are analogous to those of localization in space. Why is it that the experiences or events of our inner life are arranged in time order, as before and after? It is quite possible that it should be otherwise. Suppose a being with no memory whatever; to him each event would be now. There would be no past or future; every mental fact would be worth its face value in the present, with no relation to other mental facts. And again, granting the fact of memory, why is it that each event takes its proper place in the line of time—the place it occupied in the original experience and no other? And further, even though retained and reproduced in consciousness as a present state, why does it not simply remain a factor in the complex make-up of our present experience? In more general terms, how are states of consciousness of a purely intensive and qualitative nature projected and localized in time form?

The answer, as before for space perception, is this: *By a mental reconstruction of time, whereby conscious data are interpreted in terms of succession.*

Data for the Reconstruction of Time. The data upon which the mental reconstruction of time proceeds are exceedingly obscure; the more so because of the differences between this process and that in the case of space, to which it is supposed to be analogous. In case of space we have

non-spatial senses to compare with spatial senses. But with time there is no such resource, and we are unable to fix upon facts as absolutely necessary to the idea of time, as shown by the absence of that idea in their absence. There are one or two kinds of data, however, so consciously involved in our localization of objects in time that they may be safely indicated.

I. **Intensity as an Indication of Time.** Upon consideration, the most evident characteristic of our past experiences is their progressive fading, as they grow more remote. In general, the last hour is more distinct than its predecessor, and yesterday than the day before. It may therefore be stated as a general rule that the intensity of a representation is a sign of its locality in time, in reference to other representations brought with it into consciousness. This rests upon the principle of memory, that—with certain exceptions, to be instanced later—the power of reproduction and the intensity of the reproduced image vary inversely as the time elapsed since the original perception. Presentations, therefore, experienced in the order *a, b, c, d,* would be reproduced in an order of intensity *d, c, b, a*; and this inverse intensive order serves as a sign for their mental interpretation in the original time order *a, b, c, d.* This is further supported by the fact that mistakes as to the relative time of events are occasioned by simple differences in the intensity of their reproduction. Things which impressed us strongly linger in our memory and seem to be recent, while later events are dim or forgotten. More intense images also serve as rallying points or dates in the past, around which other events are grouped. We date many subsequent events from the death of a friend, the burning of a house, or some other great occurrence.

The fact of the interpretation of intensities cannot be deemed sufficient in itself, however, for time localization. If uncorrected, the tendency to mistakes spoken of would be a source of continual illusion. Of two successive pres-

entations the stronger would always be located last, whatever might be their real order. Hence we cannot stop here with some, who call these differences of intensive coloring the "temporal sign"; but must seek some further point of reference in the mental life for these, as yet, confused representations.

II. **Movements of Attention as Indicating Position in Time.** Although not as clearly of simple import as the fact of intensity, in its relation to localization in time, the act of attention has an undoubted influence. From one aspect, it assists and re-enforces the indication given by intensive coloring. Attention pursues, in the main, a regular rhythmical course and so brings out clearly the intensive relations of successive mental facts. On the other hand, it tends to subvert these indications, since strong attention placed upon one presentation or a series increases its intensity relatively to adjacent states of mind. The former are thus thrown out of their true time order.

As further evidence that the primary movement of the attention is of extreme import in the genesis of the idea of time, the following facts may be spoken of. *a.* The flow of time seems accelerated when the attention is agreeably occupied. This is most true when the occupation is varied in easy stages, and the active efforts of mind are not strongly taxed. *b.* The flow of time is, on the other hand, impeded when the attention is kept in a strained or concentrated condition; this is due to weariness in the mental life, which seems to have an immediate influence upon our time intuition. *c.* Time flows slowly when exciting impressions follow in such rapid succession as to leave the attention in a state of confusion. Here there is not sufficient time for the adjustment of the attention to the successive excitations, and the perception of the lapse of time is, as a consequence, confused. *d.* Time flows slowly when the mind is unoccupied. There are no outstanding ideas upon

which the grasping and relating power of attention may seize. *e.* After a given movement of attention, a future movement over the same series is easy, while the rearrangement of the series is difficult; thus the absence of mental effort is a sign of temporal order. *f.* In dreams, where the force of attention is greatly diminished, the sense of time is confused and mistaken.

The least inference which can be drawn from such facts is this: that the varying states of our attentive mental life are, in some way, signs employed in the mental reconstruction of time, *i. e.*, *temporal signs.* These signs coexist with those derived from our passive sense experiences, and together constitute a general class of data. The intensity-phases of reproduced presentations, on the one hand, seem to bear especially upon the succession of events in the past; we think of succession by the number of things in time. The phases of the attention bear especially upon the feeling of duration in the present: we measure duration in terms of our own attentive adjustment, as having experienced and expecting to experience. Duration is the feeling of the interval between things in time.[1]

Mental Synthesis. The difference between the data and their finished time form is simply the difference between the succession of ideas and the idea of succession. This difference is very great. As Bradley puts it: "Suppose there *is* a series of facts outside the mind, the question remains, How can they get in?"[2] In order to the succession of ideas, only one need be present at a time, and they need have no constant connection. But for the idea of succession there must be at least two ideas before the mind, the preceding and the succeeding. This involves the bringing up of past states to the level of the present. Now the mind sees all its states in this way—*brought up to the plane of*

[1] This distinction is due to Dr. Ward, "Psychology" in *Encyc. Brit.*, 9th ed.

[2] *Principles of Logic*, p. 74.

the present. I think of four events which happened in four successive days. They are all now present to my consciousness, and it is only my present state of which I am conscious. Of this state *a*, *b*, *c*, *d* are factors. How is it that these present intensive, qualitative states are projected in an order of time, the same as their original occurrence? How is it, to use Ward's figure, that certain states are thrown back in a line at right angles to this plane of the present? "We may, if we represent succession as a line, represent simultaneity as a second line at right angles to the first. Now it is with the former line that we have to do in treating of time as it is, and with the latter in treating of our intuition of time. . . In a *succession* of events, say of sense impressions *a*, *b*, *c*, *d*, *e*, ... the presence of *b* means the absence of *a* and *c*, but the presentation of this succession involves the simultaneous presence, in some mode or other, of two or more of the presentations *a*, *b*, *c*, *d*."[1] This is analogous, as the same writer says, to the projection of the simultaneously perceived points of the visual field in a line of spatial succession, representing distance.

It is seen at once that whatever be the qualitative coloring attaching to these simultaneous states, it can serve only as datum for their temporal discrimination. If *a* is located as before *b*, and *b* as before *c*, it can only be through the mental interpretation of some accompaniment of *a*, *b*, and *c*, respectively, by which their temporal position is determined. This interpretation or synthesis is called the *mental reconstruction of time.*

Units of Duration. If it be true that the sense of the lapse of time depends intimately upon the rhythmical phases of the attention, we would expect to find units of duration in the flow of time which would correspond with these phases. Experiments in determining the area of consciousness show such units, in the maximal length of filled time which we are able to compass with a single immediate intuition. It was stated, in speaking of the area of

[1] *Loc. cit.*

consciousness, that about twelve distinct impressions of sound, succeeding one another at intervals of .2 to .3 second, could be held in consciousness together. Multiplying this interval by the number of impressions, we have 2.4 to 3.6 seconds as approximately the extent of our distinct unit consciousness of filled time. The maximal extent of our intuition of empty time or pure duration is probably considerably shorter, as is shown by experiments as to the correctness of our estimate of small periods of time. It is found that we estimate correctly an empty period of .7 to .8 second, shorter periods being overestimated and longer periods made too short. The images given in this "unit" constitute, in contrast with ordinary representations, our so-called "primary memory."

It is through this unit consciousness of time that all time distance is estimated. The representations that it includes constitute the plane of the immediate present, which we may consider, in reference to time, as a circle, the earlier impressions in it passing out at one side and the later coming in, as a constant stream. Time, as we know it, is not a single line of succession, but numerous lines giving a certain number of coexistences in the present. It is out of this circle of the present that the past is projected in lines at right angles to its plane, like distance from the field of vision. This is but a figure to aid our conception, but so natural and convenient a figure that we employ it even in unreflective thinking: as when we say, an event is "so far back," or that two events happened "side by side." And there is no reason, in the nature of the case, that intensive data should be spoken of in terms of time, rather than in terms of space.[1]

Perception of Time by the Ear. Of the special senses the ear is most acute in the appreciation and measurement of time. Single sound stimuli are discriminated with great

[1] On theories of time perception see my *Handbook of Psychology*, vol. i. chap. x. § 3.

delicacy and exactness, both of interval and of duration. For this reason hearing is called the sense for the perception of time. Its function, in this respect, is similar to that of sight for space. It makes more exact and definite the vague time series reported first, probably, by the muscular sense and later by the other senses. This delicacy of time perception underlies the pauses of speech, the quantity of vowel sounds, the metric flow of poetry, and, more than all, the rhythm and technical "time" of music.

§ 4. Ideal Product of Temporal Localisation: Idea of Time.

From the conception of co-ordinated events in the form of past time we pass by abstraction to the idea of *time*: that is, we pass from filled to empty time. The point of immediate experience is called the present, in relation to the past, and the whole possibility of additional experience is called the future. The future, therefore, is not time at all, as the past is not: it is simply the anticipation of more experience like that already placed in the past. The finished product, the idea of time, is of late growth in the mental life of the child.

§ 5. Kinds of Memory; Local, Logical.

We have found memory, viewed entirely from the subjective side, to be the revival of an image in its network of relations with other images. Things are remembered in groups, as they were at first perceived. This involves the variety of relations which are possible in apperception. The kinds of relations thus reproduced serve to aid us in distinguishing between different kinds of memory. For example, an image may carry with it the local connections of its first perception; that is, its locality was the prominent feature of its apperception. Such memory is called *local memory*. It is in this way that we memorise long sentences by the position on a printed or written page, or

the parts and ornaments of a room. These memories are fleeting and temporary, generally, from the fact that local relations are accidental, and do not belong necessarily to the objects remembered. It is only as long as we can reproduce the whole page that we can recall the part desired. The same also is true of *temporal memories*. Beyond these extrinsic or accidental relations we find others which are essential. Cause and effect, substance and property, whole and parts, are such relations. Memory by means of these is called *logical memory*. It is more permanent and valuable than local memory, from the fact that these relations always subsist, and the related image is always suggested, when that to which it is related is capable of being presented. It is seen at once that logical memories should be cultivated rather than local, and that the latter, except when only temporary acquisition is desired, should be avoided.

COMBINATION.

CHAPTER XII.

ASSOCIATION[1]

§ 1. General Nature of Association.

Definition of Association. In the foregoing chapters reference has been repeatedly made to the principle of "association of ideas"; indeed some knowledge of such a principle is so generally implied in the affairs of life that its familiarity has been assumed. The truth that things owe their character to their associations, that men are influenced by their associates, is only a broader application of the law which takes its rise in the mental life.

The conditions under which the revival of mental images in general is possible have been stated. It proceeds upon a renewal of the nervous action which accompanied the first perception, and the reinstatement of the original apperceptive act with a sufficient intensity and duration. This, however, does not suffice to inform us what it is that gives specific direction to the flow of reproduced states. Why is it that among an infinite number of possible reproductions a particular representation rather than others is revived? This question indicates the true *function* of association, which is *the progressive revival of particular mental states.* The *fact* of association may also be defined as the *relation between revived states of consciousness, whereby continuity of successive representation is secured in the form of new integrated states.* This we must fully explain.

[1] Cf. my *Handbook of Psychology*, vol. i. chap. xi.

Ground or Reason of Association: the Preceding Idea. If we thus conceive of association, as the law of the connection of representations in consciousness, and picture the series of such representations, the nature of the connection in each case is seen to lie in the character of the antecedent image. For example, I am thinking at this instant of the rain; and why? Because I have seen the heavens covered with clouds. I have an idea of thunder because I have just seen a flash of lightning. I think of Napoleon because I have already thought of Cæsar or Alexander. In each such case the idea at present before me is determined by the idea which immediately preceded it. If the antecedent idea had been different, so would also the subsequent idea. If, for example, I had thought of Socrates instead of Alexander, it is altogether improbable that Napoleon would have come to mind. There are no states of mind which can be completely isolated from this chain of connected links. Our whole mental life is a progressive series of integrations of ideas.

Physiological Basis of Association. In speaking of the physiological habits which lie at the basis of retention we had occasion to point out the complex nature of the dispositions or tendencies in the mental life to which they give rise. We may suppose both associative connections between localities or elements in the cerebral cortex,[1] and the multiplication of these connections, in an intricate network of fibrous and cellular tissue. Considering these connections as constituting the organic counterpart of the associated mental life, we see at once the wide capacity it affords for varied and related representation. The stimulus of a single element in the network arouses many connections: first those best established and oftenest repeated, then others in varying degrees of strength of revival. For example, we may suppose the memories involved in the sight, touch, sound, written signs, and spoken word of a bell to be thus connected. The presentation of a bell to

[1] Above, chap III.

view revives at once no less than five different memories: the muscular memories involved in speaking the word bell, the word as heard when spoken and seen when written, the sound of the striking of the bell, and its hard, smooth touch. These come up in varying degrees of readiness, according as we are accustomed to exercise them respectively in our experience with bells. Other more indistinct memories, such as the church spire, dining rooms, crowd in upon us, each having its correlative accompaniment in the brain activities. The basis, therefore, of association is the same as that of retention, and admits of the same physiological explanation; that is to say, the mere possibility of association in revived states is provided for in the physiological retention of the related molecular changes occasioned at their first experience. The actual revival, however, as remembered states, is mental, as reproduction and recognition are mental. For this reason the laws of association are unconscious until critical examination of the nature of associated states reveals them.

§ 9. Laws of Association.

I. **Particular or Secondary Laws.** "When we seek," says Aristotle, "after an idea which is not immediately before us, we reach it through the mediation of another idea, either by *resemblance*, or *contrast*, or *contiguity*."[1] Modern psychologists generally follow Aristotle in this enumeration of the principles of association, at least as respects *resemblance* and *contiguity*. Deferring the discussion of contrast, we may state two great laws of association, depending upon the two classes into which, in introspection, the facts of the case seem to fall.

In the first place *images* are associated. That is, one of two or more states, all of which are reproductions, precedes and brings up the others. The face of a friend, whom I recall, recalls the place and time of our last meet-

[1] Quoted by Ribot, *Psychologie*, p. 184.

ing. On the other hand, a new experience, a *presentation*, may bring up images of the past. My new acquaintance recalls some one of my old friends. These two classes of facts exhaust the range of association. In the first of the two cases the images which come up together have been together in the mind before; this is *contiguity*. Whatever their former relation to each other may have been, when we experienced them, whether cause and effect, whole and parts, or any other of the relations the mind discovers, it matters not; it is sufficient that they have been present before in consciousness, as contiguous in time. In the second case the presentation which tends to recall the image is always seen to be like the latter in some respect; this is *resemblance*. Resemblance to an image—again disregarding contrast—is the only characteristic of a presentation, which serves as ground for the immediate revival of that image.

The two particular or *secondary* laws of association may, in accordance with the preceding, be formulated somewhat as follows:

1. *Contiguity:* Ideas which have been apperceived together are reproduced under the same apperceptive relations.

2. *Resemblance:* A presentation which in any way resembles an image tends to cause the reproduction of that image, with its related images.

It should be noted that it is only a new presentation to which the law of resemblance can be said to apply as tending to revive past images. As soon as the presentation is repeated its resemblance to the revived image is not emphasized in the reproduction, but the fact that the image which its former perception has left behind has once coexisted with the image suggested at that time, makes it a case of contiguity. For example, I meet a man B, and I think of my friend A, whom he resembles. After that the two images are associated together by reason of the

contiguity thus established; so that when I see B again the resemblance is not necessary to the suggestion, though it still strikes me, and is known to be the cause of the first association. In this case the repeated perception adds vividness and strength to the association, since the reality of the object passes over in a measure to the image which it calls up.

This reduction of a large class of cases of seeming resemblance to contiguity is a step toward the elimination of resemblance altogether, as an ultimate ground of association. Further, while we hold that, from an empirical standpoint, resemblance is an evident and real reason for the connection between ideas, and must be recognized as such, still, on reflection, we find it possible to reduce all cases of resemblance, in their ultimate nature, to contiguity. In every case of resemblance between a presentation and the image it suggests, there may be said to be elements common to the two: elements in the present presentation which affect us in an *identical* way with elements in the image which it resembles. In a strange portrait, which we say resembles a friend, there are certain points of feature or expression, few or many, which are identical with our friend's: these points coexist with others in the image of our friend, and the whole image is brought up by this coexistence or contiguity. In the presentation there are, say, elements *a*, *b*, *c*, etc., and in the image, elements A, *b*, C; the common element *b* makes the presence of both necessary. Taine formulates a law to express this process of association: *When part of an idea appears in consciousness the whole appears.* It may be added that the common emotion accompanying a presentation and a memory may supply the point of identity between them.

The great importance of the law of contiguity in opposition to resemblance is further emphasized by the experiments of Lehmann already spoken of above.[1] The simple addition of a mark, number, or name to the several shades

[1] See p. 151.

of worsted aided the memory by contiguity, when the resemblances of the pieces to one another were too great for distinction. From all the variations in his experiments he draws the conclusion that "the law that best explains the facts is the law of adjacency, in opposition to the law of similarity."

Association by Contrast. Since Aristotle various thinkers have cited contrast as a distinct principle of association. It seems warranted at first sight by a variety of well marked experiences. The sight of a dwarf brings up a giant, a bright color recalls strongly contrasted colors, sour makes one think of sweet. There can be no doubt, in such cases of contrast, of the reality of the association; but are there not other reasons than that of contrast to which it may be referred? There are such reasons, it seems, in all cases, and we are led to reduce these associations to resemblance, and ultimately to contiguity.

1. In most cases of contrast there is a standard of reference to which both the presentation and the revived image are referred: this standard constitutes a point common to both ideas, a point of resemblance. For example, the short man suggests the tall, since both are, at once, thought of in comparison with an average man. The one is short only as he is shorter than usual, and the other is tall only as he is taller than usual. Thus in the very conception of the contrasted images a common element enters. This common element is the *b* of our earlier illustration, and secures the association by contiguity. This variation from a normal standard accounts also for the association of emotional and volitional states, as great misery with great happiness, great effort with complete inertness.

2. Many instances of contrast arise from the early character of our knowledge acquisitions. The beginnings of knowledge involve, as has been seen, a process of distinguishing or differentiation: things are fixed and defined in relation to other things. This tends to fix in our minds

many instances of contrast. In early education the child is taught to appreciate qualities in some objects by having pointed out to him the conspicuous absence of these qualities in other objects, until it becomes a mental habit. All such primary connecting of contrasted things takes place among contiguous states, and frequent repetition confirms the association. If we had only seen regular oval leaves they would have no contrasted associations; but having once been led to observe leaves which are very indentate, the contrast at once presents itself afterward; but the association is due primarily to the contiguity thus established.

3. It is also true that there is an emotional coloring in cases of contrast, as in resemblance, which supplies a connecting point of similarity. Vague analogies which are stronger by reason of inherent contrasts, and contrasts which are brought out by an underlying analogy, occasion a repetition of an affective state, which ties together the members of the relation. For example, a three-handed monstrosity brings to mind a one-handed monstrosity, and all the circus oddities we have ever heard of come to mind; simply because they are all monstrosities, they excite in us a common feeling of repulsion. They resemble one another in the fact of variation from normal nature, and in the common emotion this variation excites. The same may be said of states which involve similar volitional accompaniments.

It seems true, therefore, that all cases of association by contrast may be accounted for as either *variations from a mental standard, contiguities observed and established in the process of the acquisition of knowledge*, or *emotional and volitional resemblances.*

II. **Universal or Primary Law.** One great principle of associative reproduction has been found in contiguity by succession, its special forms being simple contiguity, resemblance, and contrast. The tendency to association

by this law is greatly strengthened by other factors, whose consideration leads to the underlying principle of all association. If such contiguity were the whole case only the physical side of memory, that is, *retention*, would be operative in the reproduction; and our memories would present the uniform sequences and regular fadings which physical dispositions undergo. The peculiarities of personal mental life, the characteristics of individuals, which are so striking in the varieties of form and content of memory, would be greatly reduced. But such a supposition is impossible, since memory is mainly mental, as perception is. It is an active synthetic process of constructing relations. Apperception, therefore, is the power which gives definitive cast to our associations, and supplies the lack we have spoken of. The relations discovered in apperception in their variety, and in their intensive phases, give character and deeper meaning to contiguous experiences.

Law of Correlation: *Every association of mental states is an integration, due to the previous correlation of these states in apperception.* The relations which we discover among the objects of our perception are very varied, and many attempts have been made to classify them. Besides the relations of time and resemblance which have already found their place in association by contiguity, the principal connections which the intelligence finds among its objects are *subordination*, *causation*, and *design*. The relation of subordination has various applications, as whole and parts, substance and accident, and underlies, as will be seen, the use of the notions of genus and species in the operations of reasoning. The real logical import of this relation is only apprehended after the formation of general notions and the growth of mind on its logical side. In early childhood it is simply apperceived as contiguity. Causation also, in its completed form, involves the ideas of necessity and potency, which give it the form of a universal relation between given data, while in child life it is

simply successions of efforts and resistances. Design arises, even later in life, since it involves more seldom the simple fact of contiguity, and requires a larger stretch of experience for its generalization.

The very great value of correlations in our past experience is apparent without amplification. Mere contiguity in time may fade and disappear, when a relation remains intact. For example, all the circumstances surrounding the first perception of a match, the time, persons, manner of striking, material lighted, are long since forgotten; but the effect, a blaze of fire, is remembered. The elements of potency and necessity, peculiar to causation and foreign to mere contiguity, are in this case the means of memory. Correlation is, for the mental life, the essential thing. This has already been pointed out in the section on "kinds of memory";[1] and the reason for it is that contiguity, which is merely the mental correlative of the physical process, is supplemented by movements of the attention which give to our successive states an essential inner connection, corresponding to the relations of external things.

Examples readily suggest themselves of memories which show this difference. We remember a string of foreign meaningless words only as long as the actual sounds persist in consciousness. But if we detect, in the sounds, similarities to words in our own tongue, they remain longer in memory through this relation. But as before, it is only after the words assume meaning and sense to us that they become permanent acquisitions. McCosh tells the story of a clergyman who asked a sailor boy to box the compass backward, which he readily did from the correlations of the points of direction with one another—they had the same meaning both ways; but when the boy retorted by asking the clergyman to repeat the Lord's Prayer backward the clergyman was defeated. In the latter case the words had no correlations or meaning, and their simple contiguity was not sufficient for memory.

[1] See p. 160.

Interest[1] as Influencing Association. Another factor which influences greatly the direction and character of our associations is found in individual interests and talents. As a general thing our preferences take the direction of our talents. Individuals differ notably in the manner in which the same experiences impress them, and in the relations they discover under the same external conditions. An artist sees the red evening sky with feelings only of beauty and pleasure, while the farmer discovers in it probabilities of rain to his crops. The student of a practical and utilitarian cast of mind cherishes his books only as a means of increasing his chances of success or usefulness in life, while his more ideal neighbor studies to secure a broader mental range or an acquaintance with deeper truths for their own sake. In this there is an immediate intrusion of the prevailing temperament into the web of daily experience, carrying the attention and effort over upon specific relations of things; which tends in its turn to fix these correlations in mind and thus to heighten the disposition in its peculiarity. Interest gives direction to associations, and associations becoming fixed give permanence to interest. In general it may be said that mental work is most successful when done along the line of inclination.

It may be well to point out the danger arising from the free play of this law of association. Free exercise in the line of inclination, to the exclusion of other well-directed mental exertion, tends to develop great disproportion in the growth of mind, especially in childhood. Children should not be allowed to choose their mental pursuits. The disciplinary value of compulsory application to things which are distasteful is readily seen in the increased flexibility of the attention, greater voluntary control of the intellectual impulses, and the broadening of the mental horizon. It is only after these qualities and capabilities have been already attained by a well-balanced course of

[1] On the general psychology of interest see below, chap. xix § 1.

compulsory training that the student should be allowed to devote himself to a more contracted circle of studies.

§ 2. Forms of Association.

Association by contiguity takes two great forms when regarded in reference to the objects or events from which our mental states arise. These events or objects may coexist in time or space, or they may be successive in time. Thus distinguished we have association by *Coexistence* and by *Succession*. When we come, however, to consider that it is not objects which are associated, but our mental states, and that, in reproduction, these states must be projected in a time series whose form is always succession, we find that coexistence of objects gives rise to succession of ideas. That this is true is seen from an examination of the two possible kinds of coexistence in space and time. Objects which coexist in space, as has been already seen, are apperceived by a rapid shifting of the attention, the maximal unit of immediate apprehension, for sounding bodies, being about twelve distinct stimuli, each of which may be itself separately apperceived, and for sight about five to seven, which are given as one. For the other senses this range is still more contracted. Each such apperceptive unit constitutes a single presentation, capable of reproduction only as a whole, as one image, and not as a number of coexisting images: consequently the next image brought up is that to which the attention was next shifted, and the representation of all sensation arising from external stimuli must be in the form of succession. For example, after looking at, say, twenty crosses on a blackboard, I reproduce them as four successive representations of five crosses each, or in a longer series of smaller units, the single crosses in each unit being reproduced not as coexistent images, but as components of the unit image of five. If they are reproduced as single crosses it is in succession, arising either from the apperception of each cross

separately, or from the information that the crosses are all alike, which information takes the place of our own exploration. So, however reproduced, the representation arises from succession.

Passing to coexistence in time the same is found to be true. Experiences which happen contemporaneously are reproduced in a single complex, as one image, and not as a plurality of images present together. For example, a musical chord is reproduced in its effect, as one thing, the whole giving a single modification. It is true we may analyse this complex into its elements, but such an analysis proceeds upon a previous analysis of the actual presentation; so that the factors comprised have really been presented in succession. Suppose upon hearing the chord at first I distinguished in the whole effect four tones; the act of distinguishing or relating these tones depends upon successive acts of attention. And in so doing, the separate tone stimuli remain no longer coexistent, but are successive.

Thus we hold that the one form of contiguous reproduction is *Succession*. This we would expect from what has already been found to be the physical basis of memory. Mental reproduction was seen to depend upon the persistence of physical changes in the form of physiological tendencies toward a series of successive brain changes; these have their mental accompaniment in the succession of conscious states under the law of association. By the law of cause and effect these brain changes are a series in time, the terms being sometimes complex physically; but giving a result in consciousness which is a single mental state, and not a coexisting plurality of states. If consciousness be one, and have but one center, these changes can only constitute for consciousness one modification at a time, the result being a single presentation. The presentations thus arising are thrown into successive form by the rhythmic activity of attention, under the limitation fixed by our units of duration.[1] If

[1] See p. 127.

these units of duration were longer or shorter the succession of our ideas would be slower or faster.

Complex Associations. The complex character of the physical tendencies which underlie associations has already been remarked. It is impossible to isolate a single track of nervous connection from the general network of elements which constitute the ground of all mental reaction: and the difficulty is almost as great in regard to mental phenomena. The idea which we find associated with a preceding state is only one, in most cases, of a great number of lines of mental direction which are open for our pursuit. And this complexity is enhanced when we remember that the first idea is itself only one of the numerous associative progeny of other states antecedent to it. These so-called lines of direction—picturing the figure of a field of consciousness to which these lines would be perpendicular—all tend outward from a given point. For example, the year 1492 suggests the discovery of America, the great events of the Italian Renaissance, the Humanistic movement, and the Exodus of the children of Israel, together with any or many individual associations which may have been formed with it, such as the dates of other great geographical discoveries. Now in the revival of this network of relations the richness of its associations may serve as a help or as a hindrance to memory, according as the order of the revival be a *converging* or a *diverging* association.

I. *Converging Associations* In the converging association the mind enters upon one of many paths, all of which lead to the same result. This is the great resource of memory in cases of voluntary recollection. We cast about in consciousness for some idea related to the image we wish to call up, and the probability of our finding such a pathway to the goal depends upon the number of mental relations which have been formed around it. In case I wish to recall the date 1492 I have only to think of any one of the

events mentioned which are associated with it, since they all converge in their lines of suggestion to the one result.

II. *Diverging Associations.* In this case the process is reversed and the memory is hindered and embarrassed by its possible alternatives. If I wish to remember the date of the invention of gunpowder, and can only do so through its association with the date 1492, I am liable, in the absence of all other means of help, to go after it in connection with the Exodus, or any other of the divergent lines of association, and can perhaps only reach the true result, after having exhausted these possibilities by returning again and again to the central idea.

§ 4. Force of Association.

From the preceding remarks the influences which tend to give force and permanence to an association are readily seen. On the one hand, the physiological dispositions which render reproduction possible, are made strong and lasting in the nervous structure by frequent repetition of the stimulus. Just to the degree of the repetition, as we should expect, is the association strengthened and made facile. This repetition, we may suppose, often takes place in dreams. After seeing an object two or three times the danger of again failing to recognise it is greatly reduced. Yet the physiological dependence is the least important influence in the strengthening of association, since contiguity, though more universal, is less important than correlation in its establishment. The attention, which establishes the observed relations in association, is the most important means of strengthening them. Strong attention to a single chain of events is often sufficient to fix it permanently in mind; and we are generally able, when troubled with forgetfulness in a particular connection, to relate the desired event to some remembered fact, and thus to hold it in the memory train.

CHAPTER XIII.

IMAGINATION.[1]

§ 1. Passive Imagination.

The crowning phase of the imaging power of mind is the imagination. It may be understood in two senses. First, imagination is often used to denote the general representative function of mind, the power of representing by images, thus including memory and association, as well as the constructive working up of images. Second, the word is often more properly restricted to this last process, that whereby the material of representation at the disposal of the mind is combined in forms of ideal construction, which are independent, in a measure, of the arrangements of external objects. While the latter is more properly the function which now claims explanation, it is not well to disregard the more general phases which the broader definition has in view.

Material of the Imagination. The material of the imagination, as of the representative function generally, is supplied entirely by the earlier function of presentation. The imagination never creates. It serves only to give form to [illegible] The data of sense perception and self-consciousness supply all its content. And further, its material is always capable of being represented in the form of memory pictures.

Proceeding, therefore, to consider the broad characteristics of the imaging power, and disregarding the more particular processes which memory and association comprise, we find that general imagination is *Passive* and *Active*.

[1] Cf. my *Handbook of Psychology*, vol. I chap. xii.

Passive Imagination. By passive imagination is meant the spontaneous uncontrolled play of images in consciousness, from whatever cause they spring, and in whatever arrangement they take form. It finds its simplest type in the incoherent forms of dream consciousness. Here there is no mental supervision of the flow of ideas, no true appreciation of their relative value for the mental life, no exercise of will in selecting or combining them. The physical and intellectual causes of their production are free to work their own effects, and the result is the storming of consciousness, in its helpless state, with all the missiles of sense.

Presuppositions: Memory and Association. It is readily seen that the free play of images proceeds upon the revival and association of images. The method of this revival is both physical and mental, and consists only in the wider range of the dispositions of brain and mind which have been seen to lie at the basis of memory and association.

1. *The physical basis* here presents its most complex and intricate activity, as is seen in the boundless combinations presented. Indeed, this infinite complexity and irregularity have led many to deny the dependence of imagination upon the laws which ordinarily govern reproduction. But we have only to consider the real nature of the inter-connected chains of cerebral association to see that the truth is what the principle of association would lead us to believe. Let us consider the prevailing cast of a subject's consciousness to be determined by a great mass of systemic, emotional, and presentative groups. These cover the entire history of the past, and although their elements may be in subconsciousness, they are yet each capable, upon the reinstatement of the conditions of its first production, of asserting itself, in whole or in part, above the level of the general product. The result will not be the reproduction of long connected series of states. From the nature of the brain, the nerve elements which represent unessential or accidental

mental modifications are also readily excited. As mental states, they are outside the chain of ideas, and seem quite detached and irrelevant; but in their physical basis they are reasonable effects. And this result is indefinitely added to by the interplay of different cerebral trains. The entire brain vibrates with its single members, and surcharged parts are thus excited by connections perhaps so delicate and fine that there are no elements in consciousness corresponding to them. Thus images far removed in thought from one another and never consciously connected are thrown together in imagination

This state of complete confusion in consciousness rarely extends over its whole area, however; for while we are conscious at all there is a greater or less degree of mental supervision Even in dreams there is a glamour of logical or æsthetic consistency thrown over the most inconsistent elements. We think we are making convincing arguments or reciting delicious stanzas, which, awaking, we find it the most meaningless jargon. And in states of light dreaming, when the picture as a whole is coherent, new excitations of the senses are accommodated to it.

As has been said, dreams are the most evident type of the free play of this physical sensation. When we are asleep, the active, distinguishing, correlating, and arranging function of mind is at rest; some of the senses are freely open to excitation from without, and the mechanical element of our personality is predominant. Moreover, the withdrawal of the blood supply from the brain, which is the usual accompaniment of a reduced consciousness, tends to alter the relative potential of its parts. It facilitates the discharge of isolated regions, or exposes elements whose ordinary activity is covered by larger or more recent connections. As would be expected, very young children dream very little. They have not formed the physical habits which give to the reactive consciousness such complexity.

In our waking states, also, we often indulge in the state of uncontrolled representation, which passive imagination presents. When we relax all mental exertion, and fall into reverie or day-dreams, this spontaneous flow of images is realized. Yet the play of representations is never in our waking states as detached and incoherent as in dreams. We can usually detect, even in our states of completest intellectual abandon, the successive connections in trains of ideas, governed by the principles of regular association.

9. *The subjective aspect* of passive imagination is of more importance and of greater obscurity than its physical basis And yet its phenomena are in the main of the same nature. We would expect from the intricacy and confusion of this physical network of connections that the mental facts would present the same general appearance; and that, on the other hand, while, in the midst of this intricacy, the laws of physics hold, so in the mental phenomena, the laws of association must hold, through all the appearance of lawless flow. The first part of this expectation, that the images of imagination will show detached and incoherent form, is certainly realized in fact. The most striking characteristic of imagination is the strange and wanton nature of its combinations. Detached parts of former images are combined in unexpected and ridiculous forms. Monsters before unknown are put together from earlier creatures of thought. Situations are devised which involve persons and places impossible to be reached or associated in real life.

And all that we know of the case leads us to the opinion that the second of our expectations also holds good, and that no stretch in the current of the life of fancy escapes the principles of association.

§ 2. Modes of Passive Imagination.

Imagination, in its passive form, takes on two general modes: we first find a breaking up of the complexes of

experience into their elements, small or great, and second, we find that these elements take on new shapes. These two modes may be called, respectively, *Dissociation* and *Composition*.

I. **Dissociation.** From what has been said, the part played by dissociation is evident. If there were no such breaking up of representations imagination would be simply memory. The same forms of mental process would be indefinitely repeated. Our mental life would be wearisome in its sameness, except as we widened the range of our actual sense experience. As a process, dissociation may be more or less prominent, and its thoroughness, or the contrary, indicates the degree of imaginative power possessed by individuals, since construction or recombination must be limited to the elements at hand. In the process already described the ground or reason of this dissociation may be seen.

1. It is often due to the breaking up of physical connections in the brain. The fact of forgetfulness or fading of memory is largely to be explained by the separation and dissolution of brain circuits. The command of a language, for example, may be lost from injury to the brain leading to the loss of verbal memories or to the impairment of the movements of pronunciation. But single words or letters, parts of former groups, may remain clearly before us. By the dropping away of certain elements of a complex whole the others become more vivid and the result is a more or less complete analysis.

2. The same is true of the mental side of our memory. By the principle already mentioned mental groups are acted upon variously by the attention, and attain different degrees of permanence in memory; so parts or elements of these groups may also be affected. Of a long argument I may remember, without effort, only a single step. Of a face only the nose, perhaps, or the chin, is clear in memory. The whole of a word or sentence is often brought up

in memory from the persistence of a single letter or combination which before attracted the attention. Consequently, in the progressive fading which all representation undergoes, parts of groups, or elements of single images, fall away, while other parts or elements stand out alone. This, as before, constitutes a more or less complete analysis of former complexes. In associations by resemblance, as we have seen, points common to the two resembling presentations get similar emphasis.

3. Further than this, we will find in active imagination a positive conscious separation of the parts of images. We are conscious of a tendency toward the reduction of complex products to their elements. We note irregularities in outline, protuberances, inconsistencies, and thus isolate portions of our representations. This is seen particularly where the association is not a necessary one, and the parts dissociated have a completeness and unity of their own; as the wings, legs, head of a bird, considered each for itself, or the subject, predicate, and copula of a proposition.

II. **Composition: Fancy.** These detached data do not remain without form in consciousness, but are built up into new combinations. The forms of these combinations are, as has been said, apparently capricious and without law where there is no selection exercised in their arrangement.

The combining function of passive imagination, viewed in its product, is called *fancy*. Fancy is the familiar decking out of commonplace experience with images brought from distant and unexpected regions. Incongruous elements are placed in juxtaposition, grotesque forms grow up from most familiar elements, the most extravagant antitheses, and even contradictions, are allowed indulgence in this delightful license of thought. It brings freshness into the midst of tedious processes, and, in its subtle refinements, appeals directly to the emotional and æsthetic nature. The

passive automatic play of fancy is to be emphasised in contrast with the more purposive construction of active imagination, which remains to be considered.

The student should notice also the *enlarging* and *diminishing* functions of fancy. It brings about unexpected and grotesque alterations in the size of things. Pygmies and giants are ordinary acquaintances of our fancy. Things which we fear or dread are apt to be very large, and things which we ridicule or despise very small. It is probable that this, as many other aspects of the imagination, is due largely to the emotional colouring of the time. The ordinary correctives of reality and thought being wanting, the presentative life is at the mercy of the emotional. The idea which calls the emotion forth accommodates itself to the emotion, by way of justification for it.

Relation of Fancy to Reality. Passive imagination is characterised throughout by the absence of reference to the real world. In it the mind frees itself, as it were, from its accustomed bondage to external things, and makes its universe entirely within. The truthful images of memory are torn asunder and built up into forms never realised in nature or in sober thought. Animals are given voices, inanimate objects legs, and the world is peopled with beings as strange as rare. Yet this is true only in the nature of imagination, not in its actual results; for in its active forms, as we shall see, it maintains a constant though covert reference to reality; and even in the most automatic play which is ever realised there is slight supervision and correction from the underlying sense of consistency, beauty, and truth. The vague feeling of satisfaction or dissatisfaction which we experience in connection with our fancies is due to the habit of comparing our mental states with reality, and even in dreams, where all such reference to the external world is impossible, we make objects of our visions as truly as in the experience of our waking life.

§ 3. Active or Constructive Imagination.

Definition. In addition to the processes described in the foregoing, the active imagination involves the exercise of will in some of its forms, whether it be the positive attempt to control the images of fancy, or the merest supervision and direction of their play. This distinction is already made familiar in the cases of attention and memory. Attention was found to be passive or reflex, and active or voluntary, and memory takes two forms, reminiscence and recollection, according as it is passive or active.

The distinction, however, in this case is not an absolute one. The beginnings of mental supervision, or at least the feeling of such supervision, is found in the most mechanical play of images. Yet we shall find it valuable for purposes of analysis, as the foregoing sections on passive imagination seem to assure us.

This phase of imaging is further called *constructive*, from the nature of its product. In it is emphasized again the intentional nature of the compound state which is built up. Passive combination or fancy is a kind of construction; but here we deal with the purposive putting together of elements for the attainment of an end of use or beauty. This is the process of artistic and scientific construction.

§ 4. Analysis of Constructive Imagination.

In analyzing the process of construction by the imagination we proceed upon the account already given of the passive play of images. That is, the dissociation of the elements of former ideal complexes is assumed, and their readiness to be recombined under the guidance of an idea or "plan." We may distinguish four factors or moments in the process of construction: *Natural Impulse or Appetence*, *Intention*, *Selective Attention*, and *Feeling of Fitness*. These may be considered in this order:

I. **Natural Impulse or Appetence.** It is readily seen

that if the automatic flow of images in imagination is to be intentionally modified, there must be some impulsion, motive, or desire which leads to it. An accidental modification would be self-defeating, and would secure no systematic construction whatever. There must be some end in view, however vague, and a natural tendency toward it, an attraction or the contrary.[1] In a later chapter certain tendencies of ours toward or from certain ends or actions will become apparent. Leaving till then all further discussion of their nature, we simply note here that all exercise of will springs from these "appetences," and that the intelligent exercise of will always has in view, as its end, objects which arouse them. Among these "springs of action" may be mentioned love of pleasure and aversion to pain, the natural affections, love of the beautiful and the right: principles which are common to all men in some degree, but which vary in force within very wide limits in individuals. Any or all of such principles, which are strong enough in the individual to lead to action, or to give cast to the emotional life, may serve as basis for imaginative construction. If we are led to hope for the accomplishment of a desire, we picture consciously the actual attainment of it, ourselves enjoying its benefits and our enemies discomfited. Nothing is allowed in the scene which does not increase the pleasure, adverse elements, even when known to be real, being discarded. Simply on the ground of strong desire—of praise, money, truth—the images of imagination are constructed, built up into a consistent whole. Principal, however, among the appetences which are predominating in the imagination are the *Love of the beautiful*, and the *Love of truth*, or the desire for knowledge. These lie at the basis of the general kinds of constructive imagination, later designated *Æsthetic* and *Scientific*.

[1] See below, chap. xxv. § 3, and consult also my *Handbook of Psychology*, vol. ii, chap. xiv. § 2, and chap. viii. § 6.

II. **Intention.** Permanent preference in character leads to desire, as permanent and controlling, to accomplish something in the line of its activity. And the entire life, if circumstances do not prevent its satisfaction, is molded with this end in view. Professions are chosen, associations formed, pleasures indulged in, all of which both satisfy this permanent desire and strengthen it. This may be called *Intention.* Intention, as will be seen in the part devoted to the volitional life,[1] is a form of active readiness or consent, permanent in its kind, and needing only occasion or opportunity to flow forth into action. The scientific man has a constant impulse or "intention" toward the objects of his science. It has become to him the chosen channel for the expenditure of his intellectual energy. The artist likewise finds his whole life devoted to the pursuit of the forms which gratify his æsthetic nature. His consciousness is filled with images of the beautiful, and his intention is so spontaneous that it leads right on to volition.

III **Selective Attention.** We now reach the influence which controls the constructions of imagination, the attention. Presupposing the native preferences and tendencies which have been spoken of, the will, in attention, builds up images, which meet its purpose, into forms of novelty and beauty. The attention is given to reproductions with this construction in view. The scientist or artist views his ideas as so much material, to be directly used for the purpose of his science or art, and each image in turn is scrutinized, alone and with its escort, to discover the possibilities of combination which lie inherent in it. Images which do not present promise of usefulness in the construction are withdrawn from attention and fade away; others which fit into the growing temple of imagination are changed, divided, refined, combined, and cast into forms more complete or beautiful.

The psychological value of this phase of the imagina-

[1] Below, chap. xxvii. § 1.

tion consists in the prolonged and concentrated mental reaction which it involves: what Newton called "patient thought." Surface analogies are seen by the common mind, and need no effort of construction; but the hidden properties, the relations which spread wide out through nature and art—these are discovered only when the veils that conceal them are pierced by the power of constructive thought. Every scientific hypothesis is such a piece of construction. Only the properties of the matter in hand are taken which, by the selective attention, can be arranged in a logical framework, to be tested by further appeal to fact. Causes are imagined to be working alone, although never so found, and their effects constructed. "So Newton saw the planet falling into the sun, a thing that did not take place, but which would take place if the tangential force were suppressed."[1]

The attention, therefore, in imagination, has a twofold part. First, it is *Exclusive*, that is, it excludes representations which have no meaning for the task in hand. This is not a positive banishment from consciousness, since that is impossible. The effort to banish an idea only makes it more vivid, while the attention is held fixed upon it. But it consists in the neglect of this particular idea, as unsuited to the purpose of present pursuit. Thus withdrawn from attention an image sinks into subconsciousness and is practically banished. Second, it is *Selective*: an image is held clear before consciousness and thus found available in the growing result.

The result, therefore, is a product of apperception: since the construction of imagination is strictly analogous to the construction of the external world in sense perception. In the latter case, objects and relations are forced into consciousness to be arranged, co-ordinated, reconstructed by the apperceiving function. Here the data are supplied from the dissolution of former apperceptive syntheses, by a selective principle, only to be recom-

[1] Rabier, *Psychologie*, p. 268; compare on this section.

bined by a second synthesis. In the first construction reality is the corrective and guide; it is only after repeated experiences that our synthetic wholes in perception are made correct. Here, in imagination, this corrective is wanting; but its place is supplied by the critical selection of the attention.

IV. Feeling of Fitness. It must have become evident that this selection of images by the attention proceeds upon some principle. There must be some criterion of choice, something either in the images themselves or in the end which they are to subserve, which renders some available and others useless. The perception of this fitness requires in general two things:

1. *An end or purpose* held in conscious thought, which is to be realised by construction. It is readily seen that this must be involved in the active as distinguished from the passive imagination, since the volitional addition in this case proceeds by motives. That is, the will is exerted only for the accomplishment of something which is presented as an idea, *i. e.*, is an *ideal.*[1] This end or ideal aim, as shall be seen in considering the æsthetic imagination, may be the vaguest and most general notion, having only the characteristics of the general class to which it belongs. An artist desires to make something beautiful, or something expressive; an inventor, something useful. They begin, with this vague thought, to select their images. And as the construction proceeds, it is as new to them as to others, and satisfies them, if it meet the general requirement of their first thought. Later in the growing process the end becomes more definite, as the possibilities of the creation become evident. The artist then projects lines of possible combination, to be filled in by actual representations. To use the figure of George, this hypothetical advance of the scientific imagination is like a net, thrown over the objects

[1] See the discussion of "Ideals" below, chap. xxi. § 3, also my *Handbook of Psychology*, vol. ii. chap. ix. §§ 2, 4.

of consideration at the moment, its lines marking out the path of future discovery.

2. *Feeling of Adaptation to this end.* It is only necessary at this point to show the presence of such a feeling, not to discuss its nature or origin. It seems to consist in a sense of the adaptation of means to end. Only by it is the exclusive and selective attention guided in its choice of elements. As a feeling, it extends throughout our entire mental and active life. We pass involuntary judgment on the fitness of an instrument for its use, of the material for a garment, of an officer for his office.

This feeling, in its variations in individuals, is in large part the basis of artistic talent. The general proportions of things, the relative value of details, the harmony of discordant meanings, the reduction of varied elements to a fundamental motive—these and many other problems of the artist call this feeling prominently into play. He says: "I know not why, but I *feel* that it must be so." Some men are almost destitute of such a sense. They show its lack in the absence of personal and room adornment, in incongruous and peculiar actions—actions inappropriate to the circumstances. This lack may be summed up concisely as either the want of constructive imagination, or the want of the sense of fitness in selecting its material.[1]

§ 5. Kinds of Constructive Imagination.

We are now prepared to gain a view of the entire process of imagination looked at, not as the union of these separate activities or factors, but as what it appears at first sight to be, a single function of mind. Considering the subject-matter of the imagination and the relation which its constructions bear to the world, two general forms may be distinguished: the *Scientific* and the *Æsthetic* imagination.

I. **Scientific Imagination.** The scientific or acquisitive

[1] See further discussion of this sense of fitness, below, chap. xxi § 8

imagination is the imagination occupied with the discovery of truth. At first sight it appears true that the constructions of this faculty have no value for knowledge, and that intellect only suffers from its exercise. But we find that the imagination is the prophetic forerunner of almost all great scientific discoveries. In science the mental factors seen to underlie all imaginative construction are called into play in a highly exaggerated way. The associative material presented covers, generally, the whole area of the data of the scientific branch in hand: familiarity with the principles and laws already discovered is assumed, and, in general, a condition of mental saturation with the subject. For this reason we look to scientific specialists for new truths and hypotheses, and have no ear for the vagaries of the dilettante and amateur. Native taste, preference, and personal interest are also here highly significant. There is as distinctly a scientific genius as there is an artistic genius. Great discoverers in science have a faculty in discovering deep-seated analogies and relations, an appetence for positive truth, a tendency to accept only the confirmed deliverances of nature herself. They generally are men of great emotional soberness and intellectual enthusiasm, if the antithesis be allowed. Further than this, their imaginative process is largely under control. This is no doubt the great essential, the preponderating force of the exclusive and selective attention. Not only do great scientists see deeply, but they are able, from an exquisite sense of relative values in nature, and of relative fitness in fact, to dissect, arrange, and classify, until from a few great general resemblances the construction of a law is possible. And it is only by this act of relating attention, or apperception, that the actual law is finally constructed. A minor scientist may collect data and draw from them generic resemblances, but, with all his study and effort, he does not construct. The trained, refined, and nature-given constructive force of attention alone does this.

Relation of Scientific Imagination to Reality: Scientific Hypotheses. This form of imagination has also been called *acquisitive*, and therein it is plain that it has direct reference to our knowledge of the world and things. It differs in this both from the passive exercise of the imaging power, which has no guide but interest and preference, and from the æsthetic, whose end is pleasure in an ideal which is not realized in nature. The end of the scientific imagination is truth, and its impelling motive, love of truth. For this reason the corrective reality which is wanting in the other cases returns here in its full import. The data of this form of imagination are true images, the elements of knowledge. Its constructions are logical processes, through which further truths may be anticipated by inference; and its anticipations are worthless, unless they stand an exhaustive comparison with nature's phenomena, and by it receive confirmation. The purpose of scientific imagination, then, is utility, not pleasure.

The form of all such anticipations of nature is hypothetical. There remains in consciousness, with it all, the feeling that the product is subjective, a creation of mind, and an eager desire to test its actual truth. The constructions, therefore, of the scientific imagination are called *hypotheses*. They carry various degrees of probability, both subjective and objective. By subjective probability is meant the amount of belief which we ourselves attach to our constructions. Often the data are so well understood and the process of construction so conscious that our belief amounts to psychological certainty.

II. **Æsthetic Imagination.** The æsthetic imagination differs from the scientific, especially in the end toward which the constructive process tends. Assuming the same factors or stages in its development, the difference is seen in the fact that the end is no longer knowledge, but beauty. The selective attention, therefore, in this case, singles out elements which satisfy the sense of the beautiful, whether

or not its construction is realizable in the combinations of fact. What it is that constitutes the beautiful is to be spoken of later.[1] Among the general relations which are called beautiful are symmetry, harmony, unity in variety; representative materials which promise these æsthetic combinations are taken up and thrown into forms of construction.

The æsthetic imagination is accompanied by a lively play of pleasurable excitement, which continues throughout the continuance of the constructive work. It receives great re-enforcement or decrease, according as the conception is skillfully or poorly worked out. The emotional life is more intimately concerned than in scientific construction, and, instead of disturbing, it greatly assists the operation. The forms of æsthetic construction are also more instantaneous and inexplicable, for the reason that they arise from an emotional stimulus, and have no logical and, often, no conscious development. Great artists are usually men of strong emotional temperament, and frequently show a corresponding lack of high practical and theoretical judgment. Their conceptions take shape spontaneously, with little selection of elements, or conscious blending; and when once satisfactorily executed, they are unwilling to admit modification except in unimportant details. Further, the corrective standard of reference is now not reality, but an ideal of universal acceptance—a form not found in nature, but of which nature in her perfect working would be capable. The question as to the true province of art, imitation or construction, as the two great theories, realism and idealism respectively, announce it, cannot be long unsolved from a standpoint of the psychology of ideals. If art is the production of the imagination at all its ideals are imaginative constructions, not natural facts. The act of putting a conception in oil or marble is not alone the artist's part—a machine might do it better. The art value

[1] *Æsthetic* feelings, below, chap. xxi. § 7; see also my *Handbook of Psychology*, chap. ix. § 5.

extends to the conception. The execution is only the more or less adequate means of expression. If imitation, therefore, be the whole of art, execution would be better left to the camera and the death-mask. There is no reason that æsthetic ideals should not surpass nature as much as the forms of practical invention surpass her rude contrivances for using her own forces. Nature never constructs a phonograph, just as she never puts human thought and aspiration into simple color and form.

Laws of Imagination. From what has been said it is evident that passive imagination proceeds by the secondary laws of association, *Contiguity*, and *Resemblance*, while active imagination proceeds by the primary law, *Correlation*. In correlative association there is a deeper principle underlying contiguity and resemblance, an essential apperceptive relation; so in constructive imagination there is a deeper principle, a relation of truth or beauty, which underlies the simple contiguities and resemblances involved in the compositions of fancy.

§ 8. Ideal Product of Imagination: the Infinite.

It is from the imaging function that we attain the idea of the *Infinite*, since it is only by the enlarging of the limited data of perception that unlimited extent in time and space can be constructed. We may look at the infinite under two aspects: first, defined under its cognitive or representative aspect, it is *that to which nothing can be added, the perfect*, after its kind. It is called representative, since we find the preparation of this idea in our psychological analysis of imagination. In the scientific imagination the limit of discovery, or the infinite, is the sum of truth, and, in the ideal of æsthetic construction, we have the perfect. The other we may call the emotional aspect of the infinite, since it consists in the feelings of *inadequacy* and *awe* which accompany all our attempts to construct or picture the infinite. All images are felt to be entirely out of place, and we think of the infinite as stretching out beyond our utmost conception.

CHAPTER XIV.

ILLUSIONS.[1]

§ 1. Nature of Illusion.

Relation of Illusion to Mental Pathology. The imaginative process described above answers to the normal working of the reproductive function in its broadest aspect. Yet this faculty is subject to various forms of derangement, which greatly widen its sphere of influence in the mental life, and at the same time afford us unexpected means of gaining insight into its real nature. The study of illusions belongs properly to the Pathology of mind.

In this connection, however, we have only to deal with those irregular states of mind to which the regular processes sometimes give rise: that is, with individual unexpected states, rather than with the general and permanent irregularities which constitute mental disease. Our view includes the beginning of mental tendencies away from the line of average results; tendencies which, like all other mental products, become fixed, through habit, in forms of chronic delusion. It is in the reproductive faculty that mental aberration generally takes its rise. We can readily see how a failure in attentive selection of images gives constructions which are untrue, how mistaken vistas of memory may lead to fallacious processes of thought and mistaken forms of action. The imagination stands midway between perception and thought, and errors in its results cause far-reaching illusion.

General Character of Illusion. By illusion, therefore, in its broadest sense, we understand *mental deception*, or

[1] Cf. my *Handbook of Psychology*, vol. i. chap. xiii.

mistaken trust in the validity of a subjective state, be this state what it may. An unconscious logical fallacy is an illusion, an apparition of the senses is an illusion, a mistake in color, due to expectancy, is an illusion, a religious superstition is an illusion. Viewed thus in its breadth as coincident with all the domain of our conscious life, two general points may be found common to all classes of illusions: first, the element of *Belief* which attaches to all illusional states, and, second, the *Representative Nature* of all such states.

I. *Relation of Illusion to Belief.* It has been said that trust in a mental state, or belief in its reality, is a common characteristic of illusional states. We cannot enter here into a discussion of the nature of belief, as a psychological state, since it is not necessary to the case in hand. It is sufficient to note that the mind preserves the same attitude toward those reproductions which constitute illusions in our mental life as toward those which have a corresponding reality. The reason that the mind is thus disposed to illusion is again reverted to later. We attribute to the products of representation the correspondences which hold between the presentations of former experience and independent objects or events, external to us. And it is this belief which gives the illusion its force. The criteria or grounds of this belief, therefore, are those which justify belief in the external world, as known in sense-perception.[1] Our business now is simply to ask why in certain cases this belief is misplaced.

II. *Representative Nature of Illusional States.* The second characteristic of all illusions is their representative quality. It is only in a picture, or copy, or representation that the reality of a thing can be simulated; and it is only as the reality is itself a mental picture, a presentation, that a copy or representation can simulate it. For this reason we reach a further exclusion of states from the field of illusion, *i. e.*, those sensations, feelings, emotions, volitions

[1] See section on "Belief," below, chap. xix §§ 4, 5.

in which the affective element is predominant or unmixed. Consequently, as we should expect, illusions of the eye and ear are most common, and those of touch not unusual, these senses being most presentative; while deceptions in taste and smell are rare, except when they arise purely from mental causes, or from consistency with illusions already established for sight or hearing.[1]

Illusion due to Interpretation. Considering these two characteristics of illusions we are led to look upon all such states as the result of mistaken interpretation. In perception presentations are interpreted in terms of reality, and the interpretation is true; in illusion representations are, for the same reasons, whatever they are, also interpreted in terms of reality, and the interpretation is not true. We say *for the same reasons*, meaning that the evidence which leads to belief in the former case, the marks of reality which we recognize, are also present in the second, and induce belief here also. We are now led to ask: What are the grounds of this interpretation?

§ 2. Grounds of Illusion.

I. **Similarity of Presentations and Representations.** The most misleading feature, without doubt, of representative mental products is their very close resemblance to the original presentations. This has already been remarked in discussing the nature of mental images.[2] This being the case, there is every reason to expect mistakes in identification, unless there be some marks in the mental accompaniment or escort of reproductions upon which the mind may seize. That there are such differences is seen in the possibility of detecting and banishing illusions, but the great similarities in the case lead us, in common life, to overlook them.

[1] For example, when we are already sure there is fire in the house it is very easy to smell it.

[2] See above, pp. 169 f.

II. Absence of Internal Stimulus. The means by which, in all cases of active imagination, a reproduction is known to be such, is found, at least in part, in the feeling of voluntary effort put forth in the revival. This effort is directive, as has been seen in speaking of the selective attention, and is accompanied by the weariness which all attention occasions. We are conscious of having a mental agency in the reproduction, of being ourselves responsible in part for the outcome. This we may call an internal stimulus, as contrasted with the sense or organic excitations from which ordinary presentations arise. An entire train or network of ideas may thus be built up, constituting a secondary consciousness, parallel with the first or true series of presentations. The voluntarily pictured scene may arise before me—my distant home, friends, and all the familiar surroundings, with myself among them. But beneath it all is my matter-of-fact present consciousness, the true state of my mind, in diffused and vague attention. I attach no belief to the former, because I feel myself either responsible for its production or capable of modifying or banishing it by my will.

In the illusional reproduction, on the other hand, there is no such feeling of origination or control. The image is presented in the ordinary course of present experience, as a part of the normal content of consciousness. And the subject is led to the belief, in the absence of internal causation, that the representation is due to an external cause, that is, that it arises from an external object. In this case we fail to keep distinct the two consciousnesses, the imagined scene being as real to us as that in which we actually move.

III. Intra-organic Stimulus: Physical Change. In cases of illusion, if there be any stimulus or cause at all, and it be neither of mental nor of external origin, we are driven to the third and true alternative: the stimulus is intra-organic; it arises from a given condition or modifica-

tion of the bodily organism itself. We have found that the nervous process which underlies reproduction in general is the same in its special seat and in its motor tendency as the original perception, the stimulus arising either at the nervous center or in some portion of the nerve courses or endings. The peculiar fact that the stimulus of a nerve course is always located at the extremity, and that the special sources always react in the special forms peculiar to their end organs, has also been remarked. In these facts we have data for the projection of the images which arise from central or general organic causes into the field of real perception. Sensations of light, for example, due to the self-discharge of the center for sight in the brain—which may be the case when the irritability of the center is very high—or to the existence of resident light-points in the darkened retinal field, arising from spontaneous excitation by friction or disease, or again, to mechanical violence done to the optic nerve at any point—are alike referred to external luminous objects. There is nothing in the central process to indicate the source of the stimulus. The hearing also is often occupied with excitations which have no external sound counterpart. Children hear voices speaking to them, visionaries receive messages from heaven. All of these are cases of spontaneous excitation in the ear or center, or are due to actual noises in the head or body, conveyed through the tissues to the auditory apparatus. Among the causes of hallucination enumerated by Griesinger are the following, which are entirely physical: (1) local disease in the organ of sense; (2) deep physical exhaustion; (3) outward calm and stillness—absence of external stimulus, as in sleep; (4) action of drugs, hasheesh, opium, etc., and many deep-seated diseases.

IV. **Mental Predisposition to Illusion.** The physical processes which underlie reproduction are liable to get into the habit of discharging in certain ways, and the same may be said of the habits of mind. In the first place, the asso-

ciative law of interest holds, determining the kind of illusion to which one is most liable. Further than this, long indulgence in any train of thought, or frequent repetition of the same mental imagery, tends to give a whole class of images a readiness and facility which often become organic and illusional. But by far the most important class of cases arising from mental predisposition come from a state of high mental *expectancy*. In this state the image or idea of the expected object or event is kept so constantly and strongly in mind that the subject conceives of it as already accomplished. Other events or images take on the form of the expected event or image, by an assimilation to be spoken of later on. A good illustration is found in the anticipation of an expected sound, when it is to be inserted in a series of other sounds, the expectant attention being strained to receive it.[1] The illusions of the theater are due to this mental predisposition. And the success of the spiritualist in bringing up ghosts, lifting tables, and doing other wonders turns upon the readiness of his audience to fall into illusion. Furthermore, the state of expectancy is greatly enhanced by the addition of violent emotion, as fear or hope. When under a state of great fear the most unoffending objects take on the form of our apprehension: ordinary noises become the footfall of burglars, a harmless bush in a graveyard is a spirit, slight bodily pains are made the symptoms of frightful diseases. The emotion has an immediate influence in quickening and concentrating the attention, and the attention in turn keeps the expected image present, even when the peripheral stimulation is of the most opposed nature. And the illusion is sometimes so powerful that it affects more than one sense.

A further and perhaps more common predisposition to illusion, in the normal processes of mind, is found in the assumption which we all readily make, that *average and ordinary experience is truthful*. The growth of mind, from its earliest stages, is based upon this assumption.

[1] See chap. viii. § 7.

Indeed, development in mind is the progressive adaptation of the subjective to the objective, the refinement of harmony in a relation of which each term is dependent on the other. For this reason trust in sensations, images, reasoning is a part of those processes themselves. It is only when we find violence done to our trusts that the feeling of illusion enters consciousness at all. The real fact demanding explanation is not the question, why do we confide in some states which are not real in fact, but why do we not confide in all states. Just as the little child confides in all men by nature, and learns from painful experience that all cannot be trusted, so he confides at first, also, in all his mental states, and learns by an experience just as costly that some are deceptive. With this new experience comes also the means of defense against similar illusions, and so the indications are learned by which, under careful weighing, the illusive state may be detected.

§ 6. Kinds of Illusion.

The general characteristics of all illusional states have until now been considered. Looking at special cases more closely we find that they may be divided into two general classes: First, there are many cases in which the state which constitutes the illusion, while itself largely independent of an external stimulus, is yet brought into consciousness through some real object different in character from what it is taken to be: that is, cases in which the image seen is a misinterpretation of some real thing. This is called *Illusion Proper*. Second, there are cases in which the image is not connected with any external thing whatever, but is a pure projection into the conscious field of presentation. This is called *Hallucination*.

I. Illusion Proper. At the outset we find ourselves face to face with the whole class of experiences in which a mental state has a wrong value assigned to it. There

are, really, two conscious values involved, one the rightful stimulus as it breaks into consciousness, say the striking of the clock; the other, the image of something different, formed within the domain of the same sense quality, and usually prominent in consciousness before the time of the illusion; as the alarm of fire, into which the striking of the clock is interpreted. The latter alone is an image in the strict sense of the word, *i. e.*, a representation. The stimulus may not produce its proper presentation at all, but it may yet be used to induce an improper one.

The identification may proceed upon similarities which are very vague. In states of strong emotional tension, simply the quality of the affection—as coming from the same sense—is sufficient to produce illusion; or even farther than this, the mere fact of sense stimulation brings the dominant image into apperception, with all the marks of reality. The fact that the sensorium is in a state of reaction is sufficient, the special stimulus experienced being interpreted into that aspect of the illusional image, which would appeal to the same sense, if it were real. The timid traveler in the woods of the West at night not only mistakes trees for Indians, but every sound becomes the soft tread of the savage. The dreaded thing is so intrenched in the center of converging lines of association that the same image is called up whatever sense is brought into play. It is easily seen also that this is more readily the case when the sense stimulation is uncertain or vague in its character—as vision at night—since in this case there are fewer points of opposition to be overcome.

The actual process, therefore, in cases of illusion proper is one of *Assimilation*. The elements which should form one image are assimilated to another, under conditions of attentive or emotional excitement. Further, the intensity of the actual sensation passes over to the false image, thus bringing it into greater harmony with the actual environment.

Elements of Reality in the Illusion Proper. In virtue also of its extra-organic origin the illusion proper has elements of reality brought into it which are wanting to the hallucination. The local relations of percepts give each of them a peculiar character. A representation, on the contrary, has no space locality. Even in our dreams, in which the independence and isolation of the imaginations from disturbing reality is as great as is possible, their localization is vague and changing: the relations of space are extremely confused. And their bond of connection with one another in other respects is of so loose and unimportant a kind that the most startling and inconsistent transformations do not surprise us.

In the assimilation, however, upon which illusion proper rests these two characters are supplied by the assimilated elements. The reproduced image steps into the shoes, so to speak, of the sensation, and appropriates both its local position and its bonds of connection in the network of actual fact. The Indian seen in the forest is no longer a vague, placeless image, flitting here and there in consciousness, with no relations to other images, but he takes the place of the tree which is assimilated to him, and all its definiteness of place, time, and environment becomes his. For this reason, as will appear, the detection of illusions is more difficult than that of hallucinations.

II. **Hallucination.**[1] In hallucination all extra-organic stimulation is wanting. The illusional image is a pure projection of mind. For this reason we find that both the mental and the physical process is of exaggerated intensity. On the mental side it is only when the force of attention has been so long or so violently exerted that an image becomes fixed or imperative, that it attains the appearance of actuality. And on the physical side not only is the

[1] On the further classification and description of particular kinds of illusions see the section on "Range of Illusion" in my *Handbook of Psychology*, vol. i. chap. xiii. § 4.

nervous center highly excitable, but it is in actual movement; its discharge is automatic; instead of proceeding from the action of peripheral or central stimuli it proceeds in spite of all opposing stimuli. This state, either of mind or body, is always near the line of disease; cases of hallucination in normal health are extremely rare, and arise mostly from great weariness in the mental life. Thorough-going hallucinations are rare, further, from the absence of all means of localizing them, and of connecting them properly with outside states. Even when they are localized outside us the absence of connections enables us to detect them. Yet in some cases they carry their associated escort of images with them, giving a consistent series of presentations; this is the case in hypnotic hallucination.

§ 4. Detection and Rectification of Illusions.

In general, illusional states have all the characteristics of presentations. They are intense; they are localized; they are more or less fixed in an escort or ideal environment, which gives them an apperceptive truthfulness and force; and they are beyond our control. For the detection of illusion it is only necessary that an image lose some or all of these attributes of reality: that is, that it become very feeble, that it have no definite localization, that it appear in consciousness with an inappropriate apperceptive escort, or with none, or that it be subject to our voluntary influence. Hence from the nature of the illusional state itself we have several means of detecting it, which, when found existing together, make the case unmistakable.

1. **Diminished Intensity.** The fact of diminished intensity, as distinguishing an image from a sense presentation, has already been dwelt upon. The fact applies to all possible reproductions. This test is of little value in cases of very vivid representation, and in cases where localization enters, since, in such cases, this latter fact is the controlling one. But in cases of vague sensation, and

of sensations which are not customarily localized, we are driven to the discrimination in intensity as the only means of detecting illusion.

2. Absence of Definite Locality. On the other hand, in the case of an image whose corresponding sensation is always localized—as images of sight and touch—the absence of spatial locality is at once a sufficient means of testing it. However intense, detailed, clear, and persistent, for example, the image of a house may be, if it is not localized in front, behind, somewhere in the visual field, we pronounce it at once an illusion. The same is also true, in the main, of localization in time, in cases of illusion of memory.

3. Inappropriate Escort. This test gives us a very convenient and practicable method of banishing illusions whenever sense perception, generally, and logical thought are normal. The character which we instinctively look for in illusions is *incongruity* or *contradiction*. The primary consciousness of the actual world, as it breaks in through the open avenues of sense, presenting a consistent whole reported by all the senses together, suffers immediate violence by the intrusion of a representation which has no external truth. Incongruities and inconsistencies at once arise. These may all be considered as some form of contradiction in consciousness, and lead us to the principle known as *contradictory representation*. This principle may be stated thus: *of two contradictory states of consciousness one at least must be false*. In the processes of reasoning we find the same principle. In the sphere of representation this contradiction takes a form of repressive or antagonistic opposition among images, called *inhibition*;[1] the quality and range of escort being the ground of decision as to which is true and which false. In many cases the escort of the true presentation is already so fixed in

[1] On the analogy between nervous and mental inhibition see *Handbook of Psychology*, vol. ii, chap. ii, § 4.

consciousness and confirmed by different experiences that a hallucination is at once detected. A visual image is seen on the background of a wall or forest, which latter comes strongly out when attended to, and the hallucination disappears. An appeal is often made to another sense to refute such an image. The other sense, as touch, establishes a different external series, and the hallucination is detected.[1] This last form of contradiction—that between two different senses—affords the only practicable test, in many cases, of illusion proper in perception, since, as has been seen, the real object in this case gives to the illusional image its locality and escort, as far as a single sense is concerned. There is nothing in the physical surroundings to lead us to believe that the Indian is not really a tree, or that the slight noise is not his tread. On approaching and touching the tree, however, our illusion of sight is rectified. Further, we have here the reason for frequent hallucination and illusion when the organ of sense is fatigued. The incapacity of the organ to produce the normal presentation, and its proper escort, removes the means of detecting creatures of the imagination.

This principle of contradiction also enables us to bring to bear upon images the conclusions of a higher nature, which we have before reached—conclusions based upon sufficient reasons. Memory, natural law, testimony, experience, rational truth, any of these may lead us to disbelieve in an image, though it persists in our conscious life. A resident of New York would not believe that a herd of buffalo had been seen in Central Park or a wild Indian in his drawing room; a stone unsupported in mid-air we simply treat as an absurdity. In all such cases the sense report is subordinated to higher knowledge or conviction.

[1] Christ appealed to this test in telling Thomas to touch his body; the vision might well have been a hallucination, due to exhaustion or grief.

4. **Voluntary Control.** Our ability to banish, modify, or control a presentation is a further and the most unfailing test of its reality, since resistance to our voluntary effort is the fundamental character of external reality. This point has further explanation below.[1]

[1] See p. 206.

ELABORATION.

CHAPTER XV.

THOUGHT.[1]

§ 1. Nature of Thought.

General Character of the Thinking Process. As a departure in the mental life thought seems in its nature to present processes hitherto wanting in our study. Thought, thinking, reasoning, characterise an operation at first sight distinct from imagination, memory, perception. Yet it is from these subordinate operations, considered alone, that thought is distinct, not from the process of apperception, which includes them all.

Thought is not a "power" or "faculty" as held by the old psychology. It is rather the fuller exhibition of the one activity which we find in consciousness. In thought only does the attention, which is limited by the senses in perception, and misled by the range and freedom of reproduction, in imagination, get the upper hand, and follow its own rubrics of independent action. As related to perception, therefore, thought may be called the synthesis of percepts, as perception is the synthesis of sensations; and as related to imagination, it may be called the construction of combinations in accordance with laws of its own, and the laws of external truth; just as imagination is the construction of combinations in accordance with the laws of mental reproduction. For example, we may imagine Samson dead and the temple of the Philistines still stand-

[1] Cf. my *Handbook of Psychology*, vol. I chap. iv.

ing; there is nothing in the mere coexistence of the representations to forbid it. But we cannot *think* it, for it violates the mental principle of cause and effect.

Stages in Thought. The process which we call thought has three stages which may be somewhat artificially distinguished from one another, *i. e., Conception, Judgment, Reasoning.*

§ 2. CONCEPTION.

Process of Conception. Conception is the process by which we reach the *general notion;* which is, as shall be seen below, a representative state of mind, holding the attention upon a plurality or class of objects taken together, or upon any individual considered as a member of a class, and not as an individual. Man, tree, government, virtue, are general notions. Considered as products of conception they are called *concepts*, and considered as names, in language, *terms.* The concept is related to the percept somewhat as the percept to the sensation. The percept is built up upon the basis of sensations, but can be applied to a single sensation only as it is representative of others, or carries the force of others in itself; so a concept is built up upon percepts, and can be applied to a single percept only as it is taken to represent others. The range of a concept in its application to individuals is called its *Extension* or breadth; thus man has greater extension than poet. It applies to a greater number of single things. And the meaning of a concept in regard to the qualities, attributes, or characteristics which it includes, is called its *Intension* or depth; thus poet has greater intension than man, since, in addition to the qualities of all men, it includes the quality of being poetical. The growth of the concept may be observed from the side either of intension or extension; in the former case it is known as *Abstraction;* in the latter, as *Generalization.*

I. Abstraction. 1. *Analysis.* The finished perception or intuition of a thing, it will be remembered, involves a

synthesis of sensational elements giving a percept. The percept, in its first experience, however, is thrown into consciousness by external causes and has no clear outline. The child's first sight of his father is only a mass of visual sensations, and when he begins to use the name supplied from without, he applies it to any man indiscriminately. He has no such thing as a general conception of man; for the reason he calls a stranger papa is not that the term applies equally to other men, but that he mistakes the individual for the man he is accustomed to call papa. Yet in the psychological state of the child we recognize the beginning of a general notion—an image or symbol which answers for any one of many individuals. So it is probably, also, with animals. The peculiar features of different men are undetected, and the intension of the term, while very great, is of the most apparent superficiality. This I believe to be the origin of the general notion, *i. e.*, a particular experience accepted and trusted in as representative of other experiences. In adult thinking when new conceptions enter our mental life it is from the broadest and vaguest mental pictures that they gradually take form. My first experience of a new word, say government, in my reading, gives me only the vague meaning which I gather from the context. I carry this conception, under which all conceivable forms of government might pass, until from some other source my idea is clarified. From this point increasing experience leads me to limit the meaning of the term by dropping marks which are *not always present*. Abstraction is not a voluntary dropping off of certain qualities in order that another, already selected, may be considered alone. This would involve the conception which is in question beforehand ready made. On the contrary, it is a gradual, unforeseen process of elimination, as the discovery of truth necessitates it. Instead of starting with different governments, abstracting the quality of sovereignty from them all, and

leaving behind their individual characters, I begin with a vague notion of government, and by analysis through experience find that sovereignty alone is essential to all its forms. That is, the intensive meaning of my notion is analyzed, and only those qualities retained which experience allows me to retain. This form of abstraction may be called *Analysis*.

This process of analysis is furthered by the actual play of representations in memory. By the law of the progressive fading of memories in the past, individual peculiarities are lost, and individuals of the same general nature are identified with one another. The dim, shadowy outline thus recalled serves the purposes of the general notion, while the particular feature or element of it which gets repeated is emphasised and so "abstracted." This accounts for the greater vagueness and indefiniteness of the unessential and unremarked elements of the image, as the notion becomes more general. This reduction of images to a single "composite" or "generic image" is typified in composite photography, as Galton has shown.[1]

2. *Synthesis*. Yet another result from experience is necessary to the complete development of the concept; its enlargement in intension. In the testing which we constantly make of the adequacy of our notions we find that not only must elements be dropped from our first tentative concepts, but that others must be added. New discoveries constantly increase the intension of familiar concepts. Research in natural science reveals an unexpected property in a substance, or mark in a specimen, which is thereafter a part of the concept. This continual addition to the intension of the concept is *synthesis*.

We thus find two kinds of change constantly going on in our concepts, both of which tend to define and purify them into complete harmony with truth. But further, the

[1] *Inquiries into Human Faculty*, chapter on "Composite Portraiture."

same process, especially its synthetic aspect, tends to a modification of the concept in its extension.

II. **Generalization.** Generalization is the process of making more general the application of the class name to individuals; that is, the bringing of more individuals within the class. Abstraction both hinders and aids this process: it hinders it, inasmuch as by removing the vagueness and superficiality of the concept it rules out objects at first included, also because the synthesis of new qualities increases the demand we make of new objects; and it aids it, since, in reducing the number of qualities included, it enables more objects to meet the intensive requirement, and since the discovery of a new quality tends to bring into the class objects before overlooked which possess that quality.

The process of generalization is exceedingly difficult and in actual life seldom absolutely exact. Only in cases of complete induction can we rest safely in it. Mistakes and fallacies in reasoning, failures in nature-discovery, are usually found to rest in hasty or superficial generalization. And further, we may remark at this point the very great instability and mobility of our concepts. Since they are a development in the mind depending upon experience, and experience is unlimited, our concepts are always subject to correction and revision. A concept which seems clear and exact is given a different place and estimation in our thought, often from an hour's conversation with another; we say we "see it in a new light."

Products of Conception. From conception, therefore, we obtain two classes of ideas: the *abstract notion*, which brings before us qualities regarded as more or less distinct from the things in which they inhere; and the *general notion*, which brings before us things in more or less disregard of the qualities which inhere in them. The former is a concept in intension, the latter in extension. To these, as ready classes, the ordinary percep-

tions of our adult life are referred by the most rapid and careless reference.

Language in its Relation to Conception. Words answer the purpose in conception that images do in perception. They hold in a picture or symbol the result of the apperceptive process. The reproduced image passes through all the phases of memory and imaginative construction without repeated reference to the real objects; so words carry through all the higher operations of thought the summary of experience which the concept represents. And, further, by means of vocal articulation they make its communication to others possible. Consequently language has a twofold psychological utility: 1. It fixates and expresses exact stages in mental product, thus enabling the mind, instead of returning constantly to its experiential sources, to take its departure from some advanced position. 2. It thus greatly abbreviates and facilitates thought. A name, once given to a conception, holds it as a conquest, however circuitous and painful were the original route to its acquisition.

Yet language often serves to confuse and hinder thought, in that words tend to give a stability and fixedness to conceptions, and do not admit of the progress and rectification which the process of abstraction affords. A study of word derivations shows the manner in which conceptions grow away from the first meanings of the terms used.

The Use of Images in Conception. The image which serves to give representative force to the concept has already been spoken of. Further, it may be said that the notions which are less general have an indistinct mental picture, which presents the barest outline or scheme of the class reality. This image is seen, if closely examined, to result from a succession of images of particular objects arising in quick succession, and then discarded as having too great intension. There is a distinct feeling of the inadequacy of each image in turn, and this feeling persists in

the final representation. As Lotze says, "We feel that any other color has an equal right to serve," as that which we picture for the general concept of color. This vague outline takes its particular features from the individuals to which we have given most attention or from the properties which, from experience, we have come to consider essential. The effect of attention, also, is to bring out strongly certain properties in the concept to the neglect of others.

In the case of the more abstract notions, however, it is very doubtful whether we proceed by any actual picture; as in the concepts virtue and gratitude. Yet the image of the printed word often takes the place of such a picture. In rapid discourse, also, we seem to use the words for what they themselves convey, without farther imaging. There is no reason that the mere auditory image of a word should not answer the purposes of the concept as well as a visual image.[1]

§ 3. Judgment.

Its Nature. The second great stage in the thought function is judgment. In the judgment the discovery and assertion of relations between mental states and, through them, between the things they represent, becomes the important event in consciousness. It proceeds upon the basis of conception, for its elements are concepts in different stages of growth. In its broadest definition, therefore, *Judgment is the mental assertion of the degree and kind of relationship already arrived at in some stage of the process of conception.*

This will be illustrated in some detail in the treatment of the kinds of judgment;[2] it suffices here to give a general example. *John is a man* is a judgment. It asserts that the general concept man has reached that stage of devel-

[1] On the relation of conception to reality, *i. e.*, the controversy between Realism, Nominalism, etc., see my *Handbook of Psychology*, vol. i. chap. xiv. § 2.

[2] § 4, below.

opment in extension or generalization that it includes the single concept John; or, to express the same relation conversely, this judgment asserts that the single concept John has reached such a stage of development in intension that its essential attributes include those of the general concept man. That is, by a psychological assertion it is indicated that the qualities of the concept man have become attached to the concept John. The expression of identity between the two, found in the verb *is*, therefore, is merely the sign of this mental movement. Indicating by a the sum of the intensive marks already gathered up in the logical subject (John), and by b the marks now added by the assertion in judgment, the psychological formula of judgment becomes,

$$a \text{ is } (=) \; ab.$$

Law of Identity. The sign (=), in this formula, is used as equivalent to the word *is*, since, in the judgment, the fact that I use former experience as identical with (or as representative of) new experience, is still acted upon: indeed, it becomes a conscious principle of reasoning, in the form of the *Law of Identity* or *Non-contradiction*. The formula exhibits the constant endeavor of the mind to keep its experiences consistent. In the first member of this equation of identity, a means the reality denoted by the concept, in the second member a denotes my former concept of this reality; b denotes the addition which I now find this former concept must undergo to be true to, or identical with, the new experience of a. Of course the act of judging takes place only after this new experience, so that what I really do by judgment is to bring my former inadequate concept up to my new light. Expressed in language, a judgment is called a *Proposition*.

Unity of the Judgment. We are led by the above to see that the content of judgment is not two concepts at all, but one, a concept *full of relations*. This is readily shown by throwing the judgment into the form of the modified

concept *ab*, above. For example, the judgment, *the dog is fierce*, considered psychologically, amounts to the adding of the quality fierce, *b*, to the marks of dog, *a*, and the product, *ab*, is the single concept, fierce dog. Under this aspect it corresponds to the real object, which is only one. As far as this point is concerned, the judgment is not distinguished either from the presentation or the concept; they are all different stages in the progressive growth of apperception. This unity of the judgment, as a mental product, is further seen in simple judgments of existence, *i. e., giants exist*; where the predicate is not an attribute or mark, but simply expresses the fundamental assumption of all judgment, belief in reality.

The essential feature of judgment, in contrast with conception, is therefore this, that it sets forth in a conscious contemplative way the actual stage of the thought movement. It brings out and emphasizes the belief which attaches to the concept in its progressive stages. In the generalizing of the concept this belief was present, as each new percept was brought within its range; and in the judgment each such belief becomes explicit, *John is a man, James is a man*, etc. Asserted belief is, therefore, necessary to judgment, and constitutes its distinguishing mark.[1]

Parts of the Proposition. The verbal judgment, or proposition, may be said to be made up of three parts or terms: the *subject*, that concept of which the relation in question is asserted; the *predicate*, those elements of conception which are asserted to bear this relation to the subject; and the *copula*, the verbal sign of the relation between subject and predicate. In the judgment, *Napoleon*

[1] See the discussion of "Belief" below, and the corresponding fuller treatment in *Handbook of Psychology*, vol. II, chap. vii. On the relation of judgment to belief the student may also consult my article "Feeling, Belief, and Judgment," in *Mind*, New Series, vol. i. (1892), p. 403.

conquered Europe, these three parts are seen in the usual order, subject, copula, predicate.

§ 4. Kinds of Judgment.

I. **According to Intension.** Judgments may be considered with reference to their structure as being of two kinds: *Analytic* and *Synthetic*. Psychologically, these aspects of the judgment indicate different stages in the further development of the concept. The analytic judgment consists in an expansion of the subject in an assertion whose predicate has been before included in the intensive marks of the subject. For example, *trees have trunks* is an analytic judgment, since the marks represented by the word trunk are a necessary part of the concept tree, and its assertion is merely an expansion of that concept. This form of judgment, therefore, represents the development of the concept in the stage of abstraction called above analysis. The vague first-notion tends toward definition and differentiation, by the dropping of accidental marks, and the confirmation and assertion of those found to be essential. The synthetic judgment, on the other hand, is the product of the building up or synthetic process of abstraction. It asserts predicates before undiscovered, or unincluded in the notion as before made up. For example, *cows are ruminating animals* is a synthetic judgment. The quality of rumination is added to the notion cow, as a mark. And synthetic judgments are constantly passing into analytic. To the naturalist, the ruminating quality is essential to the notion cow, and the judgment which asserts it is analytic.

This distinction may be viewed also from the side of extension. The continuous growth of concepts, through the formation of successive synthetic judgments, is seen in the process of education. The pupil's conception of the thing in hand is enriched by all the predicates of his instructor's knowledge.

II. **According to Belief:** 1. **Categorical Judgments.** The simplest form of mental assertion, in which an affirmation or negation is made, is the categorical judgment.

a. Simple Categorical: the ordinary synthetic and analytic judgments already spoken of.

b. The Existential Judgment rests upon a deeper mental movement than either analysis or synthesis, and represents the assertion, in a special way, of the belief which characterises judgment. It goes beyond belief in the consistency and adequacy of concepts and their relations, and attaches itself to belief in the external reality, in nature, of what the concept represents. *The moon exists* is an existential judgment.[1]

Law of Sufficient Reason. The existential judgment brings out not only the natural tendency to believe in the facts of mind; it supposes some question aroused, and its refutation, through what we call evidence. There is no psychological meaning in the judgment *mermaids exist*,—unless I have, or have had, some reason to doubt their existence. The judgment rests therefore upon the removal of this doubt by evidence. Here we are brought face to face with the conscious working of a great law of thought, regulating and making consistent the content of representation, i. e., the law of *Sufficient Reason.* In the judgment of existence, the ground or reason which consciousness has for accepting, rejecting, etc., for the first time becomes evident to itself; and we find that we cannot explain further the fact that consciousness must work under such a principle.

c. The Disjunctive Judgment is a form of categorical statement, in which a disjunction, or assertion of alternatives, expresses the attitude of the mind with respect to belief, toward a certain class of facts. That is, the ground

[1] On the nature of the existential judgment see the article already referred to on "Feeling, Belief, and Judgment," in *Mind*, New Series, vol. I (1892), p. 403

of the statement is of such a nature, that more than a single relation among the elements involved may be possible. The assertion, therefore, has reference to all these possible cases. For example, *this man is either a minister or a lawyer* is a disjunctive judgment, the reason of its assertion being adequate to either conclusion, say the dress, manner, conversation, of the person involved. Further search, or clearer definition of the ground of the assertion, eliminates all but one of these alternatives, and the judgment takes the regular categorical form.

9. **Hypothetical Judgments.** The hypothetical judgment stands, with reference to belief, midway between the ordinary assertion of the analytic and synthetic judgments, and that of the existential. The former express only belief in the truth of the relations brought out in analysis or synthesis; the existential judgment expresses only belief in a reality of the object denoted: but the hypothetical judgment has reference to both these phases of belief. In the hypothetical, the ground or sufficient reason is cited, as the mental condition upon which belief in the statement made goes out. For example, *If the morals of the people are corrupt, the Republic will not live*, is a hypothetical judgment. The belief in the proposition (synthetic) *the Republic will not live*, rests upon the belief (existential) in the proposition *the morals of the people are corrupt.* The failure of this belief in the sufficient reason, or *antecedent*, removes the ground of belief in the result, or *consequent*, and the mind is left in a state of uncertainty. The attitude of the mind in this judgment may therefore be called one of *contingent* belief.[1]

§ 5. Reasoning.

We now have to consider the combinations which are effected among judgments in the processes of argument

[1] On the "Relation of these different kinds of Judgment to one another," see that head in *Handbook of Psychology*, vol. I. chap. xiv § 5.

and inference. Reasoning takes two forms called *Deduction* and *Induction*.

I. **Deduction: the Syllogism.** Psychologically, the syllogism may be defined as: *The assertion of a relation between two concepts in consequence of the previous assertion of the same relation between each of these two concepts and a third.*

The parts of the syllogism thus brought out are designated as follows: the two relations first asserted are called *premises*, major and minor; the two concepts between which the resulting relation is asserted, *terms*, major and minor; and the concept to which they sustain respectively the relations of the premises, the *middle* term; the resulting judgment is further called the *conclusion*. For example:

> Major premise—All men are liable to error.
> Minor premise—The president is a man.
> *Conclusion—The president is liable to error.*
> Major term—Quality of being liable to error.
> Minor term—The president.
> Middle term—Man.

From this definition, it appears that the unit of syllogistic construction is the judgment. It is by the judgment, as a psychological movement, that both the major and minor terms are related to the middle term in the premises, and it is by the judgment that their relation to each other is made clear in the conclusion.

The fact that the product of the reasoning process is the judgment, shows further that the mental act is the same as in conception; that is, that there is not a further mental synthesis, in kind. The function of reasoning is the multiplication and transformation of judgments, not the derivation of new mental *forms*, nor the building up of new products. Reasoning is, therefore, a process of enrichment of our mental stores, through the going out of

belief, over a wider range of fact, and into deeper penetration of its meaning. The implications of former beliefs, which were vague or dimly apprehended, are unfolded, conceptions remote and disconnected are brought into the general harmony of truth, in relations, perhaps, before unremarked.

Conceptual Interpretation of the Syllogism. We may further define the syllogism in such a way as to show the growth of the concept in it, remembering what has been said as to the unity of the judgment: *Syllogism is the result of a synthesis whereby we reach a new stage in the growth of a concept, in consequence of its twofold modification in the judgment.*

As the former definition looks at the syllogism from the side of its expression, this looks at it from the side of its meaning. Its apparent strangeness vanishes as soon as we refer the syllogism to the doctrine of conception as already stated.

We have seen that the product of judgment is only the concept, of which predication is made, modified by the addition of new marks: *a* becomes *ab*. Thus arises the major premise. In the minor premise the concept *ab*, or middle term, is further modified by the addition of *c*, minor term; that is, *ab* becomes *abc*. The conclusion is then simply the statement of the result, that *a* has become *abc*:

(1)
a is (—) *ab*;
ab is (—) *abc*;
hence *a* is (—) *abc*.

(2)
John is (John) man;
(John) man is (John man) mortal;
hence John is (John man) mortal.

This simply means that the reality John requires that I add to my notion John, the marks of man, and the marks of man further carry with them the mark mortality. So

that my concept John must hereafter carry with it the marks of man including the mark mortality. The process exhibits again the striving of the mind to preserve the identity of its conceptions through new experience.

§ 6. Induction.

II. **Induction.** The second kind of reasoning, Induction, proceeds by a direct appeal to experience rather than by a comparison of concept with concept. It reaches a statement or "conclusion" of what new experience is likely to be from what it has been. It represents, accordingly, the tendency of consciousness to go a little ahead of the facts already discovered to the construction of a statement or hypothesis to explain them. The uses of induction have already been discussed in the chapter above on "Method in Psychology."[1]

Relation of Induction and Deduction. The two processes of induction and deduction do not exclude or invalidate each other, but are the united engine of discovery and proof. The first way of knowledge is by experience, which is taken up in conception, and cast into the form of hypothesis or empirical law, by induction. These first stages in the growth of thought give us a point of elevation for again exploring the varieties of experience, and bringing new classes of fact under our conquest by deduction. Thus there is a constant action and reaction between the two processes of reasoning: one leading us from the particular to the general, the other from the general back to the particular. And for each such excursion, we are richer in our mental store.

§ 7. Proof.

Proof is the inverse process of inference. In the syllogism and in induction, we are given premises, the sufficient reason, to find the conclusion, the result: in proof, on the

[1] Chap. 2.

contrary, we are given a conclusion, or *thesis*, to find its sufficient reason, or *ground*. For example, given the thesis *the president is liable to error*, it is proved by finding the sufficient reason, *all men are liable to error and the president is a man*. The essential nature of proof, therefore, consists in establishing belief, or giving reality to a thesis.

The adequacy of the ground thus reached is tested by throwing it into the regular forms of reasoning: either deductively, as in a syllogism, concluding to the thesis; or inductively, by raising the thesis to the rank of a hypothesis by the citation of particular cases in which it seems to be true. Thus the thesis, *poets are liable to error*, may be proved by this deduction:

All men are liable to error;
poets are men;
hence *poets are liable to error*;

or inductively,

Tennyson, Wordsworth, etc., are liable to error;
but Tennyson, Wordsworth, etc., are poets;
hence *poets are liable to error*;

the major premise being a hypothesis tested in experience.

Deductive proof alone gives complete certainty, since the ground is some rational or thoroughly established principle. Its province is the proof of singulars, or of subordinate laws. Inductive proof, on the other hand, never reaches absolute conclusiveness, except in exhaustive inductions, and is of use in establishing general and higher laws. It covers proof by analogy, testimony, circumstantial proof, and other forms.[1]

§ 6. Ideal Product of Thought: The Rational Function.

As a process of synthesis, thought brings into clearer light and greater definiteness the ideal products of per-

[1] On proof in general, see Sidgwick's excellent chapter in his book on *Fallacies*.

ception and representation: *unity, contradiction, identity,* etc. We come through thought, also, to the apprehension and statement of the principles of Reason which underlie and regulate all mental movement. The fundamental forms of Reason, as far as they belong to intellect, have already been noted in the foregoing discussion. These are the laws of *Identity* and *Sufficient Reason*. Other rational principles become apparent in connection with Feeling and Will. Their more particular treatment belongs to "Theory of Knowledge," a department of Metaphysics. For fuller psychological treatment see *Handbook of Psychology*, vol. i. chap. xv.

PART III.

FEELING.

CHAPTER XVI.

NATURE AND DIVISIONS OF SENSIBILITY.[1]

§ 1. NATURE OF SENSIBILITY.

Definition. The term sensibility has been used heretofore as almost synonymous with consciousness; at least the assumption has been made that when consciousness is once reached, sensibility or feeling is its primary and most general characteristic.

Empirical observation justifies this assumption. Our final interpretation of all mental facts in common life is in terms of personal feeling. How do I know that I am willing a given act of conduct? Because I *feel* the act of will. My immediate ground of confidence is a qualitative state of being affected, which I have learned to distinguish in my experience under the name will. How again do I reach the assurance that I am thinking and not willing? By a similar awareness of feeling. I am affected in the way which I call thought. The original awareness of consciousness, therefore, is an affective state, and sensibility, feeling, is its first content.

If this be true, we would expect to find feeling everywhere in the mental life. It would be a more or less prominent accompaniment of all possible states of consciousness. This view, though generally admitted by psychologists, is only partially accounted for on many of

[1] Cf. *Handbook of Psychology*, vol. ii. chap. iii.

the theories of sensibility; it will become clearer after the examination and description of the various classes of feelings.

Looked at from the fact of its universal presence, from its priority among conscious states, and from its peculiar subjectivity in opposition to the objective reference of intellect and will, we may arrive at a general definition of feeling: *feeling is the subjective side of any modification whatever of consciousness.* As a general description we may say, further, that feeling is the *agitation, excitement,* of an event in consciousness, considered apart from what the event itself is or means.

The fact of feeling is so clear in our common experience that no more exact definition would be needed if it were possible. What we mean by *my* consciousness in opposition to *your* consciousness sums up feeling. You can know the object that I know and you can will the action that I will, but you cannot by any possibility feel the events that I feel; if I endeavor to describe my feeling to you, by so doing I make it the object of knowledge, and my state of feeling is changed. This is subjectivity, this peculiar and unapproachable isolation of the events of one consciousness from another.

Most General Marks of Sensibility. A distinction has already been drawn between *common* or *general* sensibility, and the more particular kinds of affective modification which we call *sensations.* The latter belong, speaking generally, to the more differentiated portions of the nervous system provided with special end-organs.

In *common feeling*, therefore, are included all modifications of sensibility which do not come under any of the classes of special sensation. Stated thus negatively, the way is open for the differentiation of this great fund of sensibility into as many particular divisions as psychological analysis may be able to discover.

When such analysis has been pushed to its extreme and qualitative differences in sensibility have been pointed out

as far as may be, the point of interest then remaining has reference to the most general marks of sensibility itself, the common elements beneath all its concrete forms. What is it that brings the special as well as the organic sensations, the vaguest feelings of physical unrest as well as the acutest pang of an exposed nerve, all under the common name feeling? Such common marks we find, first, in the fact of *excitement* or amount of consciousness; and, further, in the peculiar something which we call *pleasure* and *pain*—a second element which always accompanies and colors mental excitement.

Pleasure and pain may be set apart, at least for convenience of exposition, from the particular mental phenomena which they accompany. If pleasure and pain be truly designated as a most general characteristic of sensibility, then no mental state whatever is entirely neutral as respects pleasure or pain. Yet in the great complexity of the developed mental life, where cross currents of feeling interfere with one another and neutralize the effects of one another, it is quite possible that pleasure and pain may not enter as an outstanding feature of consciousness; indeed such a neutrality as regards pleasure and pain may be attained in states of high emotional excitement, that while feeling is at its maximum it seems to be without positive hedonic coloring.

As concrete facts, however, pleasure and pain are always elements added to some conscious content. It is in this aspect that they are described as (hedonic) *tone*, the states of which they are the tone being more or less exactly discoverable.

Further, states of sensibility are *complex* and *simple*. All events in consciousness which have distinct qualitative value (sound, smell, fear) in addition to the general marks of sensibility are "complex" states of feeling; those which are simply consciousness with pleasure or pain (if there are any such) are "simple."

§ 2. Divisions of Sensibility.

In view of the foregoing, states of sensibility may be thrown into the following table:

Sensibility:

- I. Lower, or Sensuous Sensibility.
  - *a.* Complex: sensuous feelings.
    - 1. Common sensuous feelings } sensations.
    - 2. Special sensuous feelings }
  - *b.* Simple: sensuous tone.
- II. Higher, or Ideal Sensibility.
  - *a.* Complex: ideal feelings.
    - 1. Common ideal feelings } emotions.
    - 2. Special ideal feelings }
  - *b.* Simple: ideal tone.

We have already discussed the quantity, or intensity, and the quality of sensations; it remains to notice pleasure and pain. Thus the entire "affective element" in sensation is exhausted. The "presentative element" has already been found to be due to the apperceptive function.

CHAPTER XVII.

PLEASURE AND PAIN.[1]

§ 1. PHYSICAL CONDITIONS OF PLEASURE AND PAIN.

General Conditions of Pain. Before an attempt is made to report the more general organic conditions of hedonic tone, the empirical cases of the rise of such pleasure or pain should be enumerated. After that, perhaps, some general characteristics of all such cases may become apparent and serve to throw light upon the wider question. Phenomena of sensuous pain, which may be considered first, are clearly marked.

1. *Too much stimulation is a cause of pain.* This is true, in the first place, of high *intensities* in stimulation. The actual experience of such painful intensities in the cases of special sensation leads us to look for it in all forms of sensibility. A blinding light is painful; a loud noise very close to the ear, rapid friction of the skin, great pressure upon the muscles, etc., all give rise to painful feeling. It is true also that very strong tastes and decided odors are disagreeable or soon become so; but the case of these sensations seems to differ in some respect from that of the senses which report acute pain, properly so called. Sensations of temperature, again, either heat or cold, give us positive pain when the degree of either stimulus is very intense. It is possible that the apparent difference between taste and smell and the other sensations, in this respect, may be due to the fact that in them the end organ seems to have a chemical function, while the other end organs are largely mechanical. But it is enough here to point out the

[1] Cf. *Handbook of Psychology*, vol. ii. chaps. v. xi

fact that some tastes and odors are always disagreeable, however slight the stimulation be, and that others seem to be always pleasurable, however intense the stimulation. Bitter tastes, for example, are always normally disagreeable, and sweet tastes normally agreeable.

The fact of too much stimulation may also take the form of too long an application of it in *duration*. The organism becomes exhausted and pain results. And a third case is that in which the stimulation is too *extended* in its effects. For example, a number of pin points drawn over the skin give pain when one of them would not. The eye can accommodate a small point of light of a degree of brightness which would be painful from a large surface.

2. *Inflammation*. The same painful effects follow ordinary degrees of stimulation when an organ is in an inflamed condition. Irritation is painful when the skin, for example, is stretched or distended. In diseased condition of the eye the slightest degree of light may be painful.

The same is true also of the nerves themselves. Inflammation may extend to the nervous tissue; it is then sensitive to slight degrees of stimulation, and the reaction is painful. This painful tone is present often under intensities of stimulation to which the nerve is not ordinarily sensitive. The general fact of this paragraph is expressed by saying that a condition of hyperæsthesia extends also to the painful element in sensibility. It may also be added that the opposite is not always true, but may be: namely, that sensuous anæsthesia extends to the painful element in sensibility. In other words, tactile or muscular anæsthesia is not always accompanied by analgesia.

3. *Summation of Stimuli*. A painful reaction may be brought about by the summation of stimuli themselves not painful. Several electric sparks in succession are painful, where one is not. This is probably only a further application of the fact that high intensities are painful. It is given a separate place, however, since here the high in-

tensity does not become so until it reaches the center, while in cases of intense stimulation the intensity is such at the point of application on the periphery.

4. *Appetites or Impulses when denied* give rise to pains of want. Such pains are usually periodical, and indicate a lack injurious to the organism.

Less General Conditions. Besides the above, several more special conditions bring about a painful reaction in some one or more of the various divisions of feeling. Exposure to air is a cause of pain to tissue normally protected by the skin; disuse, or too slight stimulation, occasions pain in the more complex of the special senses, as sight; lack of accommodation of the organ to its stimulus has sometimes disagreeable tone, which is exaggerated when the stimulation is intense. The tone of the organic feelings seems to arise from any obstruction of the organic functions, such as laceration, cramp, repletion, etc. Intermittency of stimulation is also a frequent cause of pain, probably from the failure of the organ to accommodate to the broken stimulus.

Empirical Facts concerning Pain. There are, in addition, certain facts brought out by physiologists which throw light upon pleasure and pain. First may be mentioned the *intermittence of pain:* the greater or less intensity of painful feelings at successive moments, the stimulus remaining constant. It is plainly seen in electrical stimulation—a clear rhythm, or rise and fall, of the painful tone. A headache usually proceeds by throbs, a toothache by jumps, and a felon on the finger changes its feeling from a dull ache to a paroxysm of overpowering severity. That it is due to nervous causes, and indicates the ebb and flow of central processes, is claimed from such phenomena in intermittent fever; but in some cases it evidently depends upon the rhythm of the vascular system, the distention and reaction of the blood vessels.

Another kind of intermittence is brought about by the

coming and going of the attention. The effect of the attention in increasing the intensity of affective states is familiar; hence we would expect that the concentration and withdrawal of the attention would have a marked influence upon the rise and fall of pain. Further, we know that the attention, even when concentrated as steadily as possible, is rhythmical; so here appears a further possible explanation of the intermittence spoken of.

Another interesting fact of painful feeling is what is called its irradiation or *diffusion*. The locality of a painful stimulus is less circumscribed as the stimulation becomes intense. Besides the intensity, or quantity, this feeling becomes massive or spread out. It is probably due to a real spreading of the cause of the painful feeling over a greater area, both on the periphery and in the central seat.

Again, we may note a *delay* in the conscious awareness of pain compared with the appearance of the sensation with which it seems to be connected. Even when the stimulation is a very strong one, the sensation is clear in consciousness before any pain is felt. A blow, for example, is felt as contact or pressure a fraction of a second before we begin to suffer from it; a burn is particularly long in reporting itself as pain. This delay may be measured by comparing the reaction time of a painful stimulus—say the decided prick of a pin—with that of a simple contact sensation at the same point on the skin. It is probably due to the fact that the full force of the pain-stimulus is not reported at once, but that the organ accommodates itself to it by a series of partial transmissions. These transmissions are summated at the center, and the result is a sufficiently intense central stimulus to occasion a painful reaction.

Further, the duration, or *lasting quality*, of a painful state of sensibility is remarkable. Pains do not pass away, as painless sensations do, when the stimulation ceases. The recovery of the organism is very slow. What is called an after-image of some sensations seems here to be more truly

an after-*feel*. It is probably due to the fact that the intenser degree of stimulation necessary to pain gives more decided and lasting character to the nervous change it works than feeble stimuli do. This is supported by the observation that pains are more distinctly and easily revivable than other affective experiences. A painful experience seems to hover constantly around us, and thrust its unwelcome presence into our gayest hours. When we remember that a revived image occupies the seat of the original experience, we only have to assume a more lasting effect to have resulted from a painful sensation, to account for its more easy reproduction.

Finally, pain lowers the temperature of the painful region.

Conditions of Analgesia. Insensibility to pain under conditions usually painful may be brought about by various agencies. Cold of very great intensity has this effect, pain becoming very acute and then subsiding altogether, as the temperature is lowered. The withdrawal of blood from an organ makes it insensible to pain. Lowered sensitiveness to pain, however, is likely to be preceded by exalted sensitiveness, as in the evident case of cold. Apparent absence of pain is experienced when the intensity of a painful stimulus is suddenly lowered, even though the second intensity would be painful under other circumstances.

Pain as Feeling and as Tone. The conditions of pain now pointed out are conditions in the operation of the various modes of sensibility, general or special; that is, we have been observing pain as tone. The important question arises: Is pain always thus dependent on a definite form of sensibility, or is it itself, as a form of sensibility, ever found independent of its presence as tone? There are some facts which would indicate that pain has a functional independence, whatever we may say as to its anatomical[1] independ-

[1] *I. e.*, whether there are special nerve fibers which conduct pain, a point on which experimental results are conflicting.

ence. For instance, pain may be destroyed without impairing any of the other sensibilities, as in analgesia brought on by chloroform; and in general, under the influence of anæsthetics, pain and memory disappear first and together. On the other hand, other sensations may be destroyed while the painful quality of their stimuli remains. Thus, under pressure, sensations of touch, temperature, and muscular movement may be destroyed while pain remains. So, also, under loss of blood in a member, sensations of touch disappear before pain, and both before temperature, electric feelings, etc. In other words, the various elements of common sensuous feeling may be paralyzed separately. It does not follow, from this, further, as we will see, that when the physical contributions of pain are removed consciousness has been robbed of its hedonic quality altogether.

Physical Conditions of Pleasure. It is not as easy to point out the physical conditions of pleasure; but in general we find them opposed to those already indicated as carrying painful tone.

1. *Moderate Stimulation is pleasurable.* This is readily seen in the exercise of the special sense functions; the eye is pleased with mild colors, and the ear with pure tones. Gentle touch, quiet muscular reaction, moderate tastes, are usually agreeable. And it is true of moderate durations and areas of stimulation, as well as of moderate intensities.

There are striking exceptions, however, to this rule. A great many sensations are always painful; when not giving a painful reaction, the organs involved do not affect consciousness at all. So the organic feelings. Certain tastes and odors, also, are always disagreeable. Further, the condition of neutrality seems very nearly reached in the normal exercise of some of the sense functions, as, for example, sight and hearing.

2. *Pleasure arises from the Adjustment of an Organ to its Stimulus.* Muscular sensations are pleasurable within

the range of easy effort. Stimuli of longer duration, which give time for the full adjustment of the organ, pass from the painful to the pleasurable. Feelings for which we are ready by anticipation are enjoyable. Yet this is also subject to the qualification that perfect adjustment seems in many cases (eye and ear) to have no feeling accompaniments whatever, either of pleasure or pain.

3. *Activity is enjoyable.* By this is meant function within the limits set by the two conditions already mentioned. If activity is pleasurable, it is the moderate activity of a well-adjusted organ. Yet there seem to be more massive organic conditions of activity which are pleasurable, even when such a general function involves some particular pain. The football-player enjoys his sport, even though he is never free from the pain of bruises or scratches. In such cases, the vigor and energy of the larger organs brought into play seem to overpower the protests of the smaller, and silence their complaints. A pain which would make one wretched if suffered in passive silence is forgotten altogether in the pleasure of diligent employment. This larger activity, however, which brings pleasure, must itself conform to the conditions of moderation and adjustment.

Moreover, these pleasures of activity, such as pleasures of the chase, of sports, of general vigor, are more positive apparently than any other physical pleasures. The claim already noticed, that in the absence of pain many states are not really pleasurable, but merely neutral as regards tone, does not seem to be well taken in this case. A condition of fresh muscular vigor seems to intrude itself into consciousness of its own force, and we become aware of pleasant occupation with no evident reference to the corresponding state of pain. Indeed, the opposite pleasures which result from a cessation of muscular pain—the so-called pleasures of rest—are something quite distinct from these pleasures of activity.

Under this head, also, as including any function, and not simply muscular activity, the pleasures arising from the gratification of the organic appetites and instincts appear to fall. They are functions of periodical exercise, and their normal working involves periodical stimulation. They seem to involve pleasure over and above the prompting of painful appetite; though this again is in dispute. Yet it could hardly be said that all the pleasures of the table are due to the cessation of the pangs of hunger.

Relativity of Sensuous Pleasure and Pain. The fact referred to above, that many physical pleasures are only relief from preceding states of pain, finds place with other similar phenomena, under the law of relativity. First, we may say that the existence of either state may under certain circumstances arise from the cessation of the other. Cases of seeming pleasure, which is explained as absence of pain, have already been mentioned. Similarly, the cessation of an active pleasure may give us temporary pain and be the only cause of it. An element of higher emotion, however, generally enters in this case. Again, the intensity of pain or pleasure depends largely upon its contrast with a preceding state. After an unusual trip to the country, the painful toil of city life is all the harder to bear; so, after feasting the eyes upon a dish of luscious fruit, the beggar's plate of herbs is all the more unpalatable. So, also, the associations involved often convert pleasure into pain, and the contrary. A little clever deceit will make us enjoy a dish which before we found unpleasant.

§ 2. Resulting Conception of Sensuous Pleasure and Pain.

From the foregoing brief description of the conditions under which sensuous tone arises, we may put all such feelings under two larger physical categories. A careful examination of these conditions will show that all pleasures and pains involve either a state of change in the organic

tissue, in the way of *integration* or *disintegration*, or a change in the relation of the organism to its environment, in the way of *adjustment* or *misadjustment*. These two aspects of the case may be considered separately.

Pleasure and Pain as resulting from Integration and Disintegration. Considering pain from the side of the organism, it is easy to see that all the pains of the body are due to disintegration of tissue, except those cases in which any amount of stimulation seems to result in unpleasant tone, such as tastes always unpleasant. That is, very intense stimuli are known to injure, tear, wound the organ stimulated; stimuli summated to a painful degree have the same effects. The cases of stimuli which are always painful may be brought under the same category, if we find it possible to review the response itself as a sign of such disintegration; a position which the chemistry of tastes and smells at least does not dispute. Bitter tastes, for example, we may well consider as resulting from a stimulus damaging to the taste apparatus; so with strong acids.

Yet we cannot say that all disintegration is painful, for the moderate stimulation which usually gives pleasure is also moderate disintegration. Any stimulation whatever involves expenditure; such expenditure means the liberation of energy before stored up, and this using up of energy is work done in the tissues. Hence we are obliged to say that under some conditions, at least, disintegration is pleasurable; so the pleasure of exercise.

On the other hand, integration is sometimes pleasurable, as in the case of pleasures of rest; but integration is sometimes painful, as in the pains of inactivity and disuse. What, then, shall we say?

The state of the case seems to be about this: the life process is a process both of integration and of disintegration; the organism is built up, but is built up by previous tearing down. Expenditure is the law of acquisition; con-

sequently disintegration which ministers to health and development is pleasurable, as integration also is. On the other hand, disintegration may overstep the legitimate expenditure of the life process, and become painful; and integration may also be painful, because too continuous to permit the proper expenditure demanded for the life process.

If, now, we consider pleasure and the absence of pain the accompaniments of the normal life process, and pain the accompaniment of any organic event which interferes with the life process or checks it, we seem to have a consistent conception; it explains the facts, as far as integration and disintegration are concerned.

Pleasure and Pain resulting from Adjustments and Misadjustments. It has already been made evident that integration as an organic process would not include all the phenomena of pleasant or unpleasant tone. A variety of cases point to the relative adjustment of the organism to its stimulating environment as a principle of perhaps equal importance. Wherever such misadjustment is so overpowering as to affect the tissue of the organ in question, the resulting pain comes clearly under the principle of disintegration; but when such positive effects are not clearly present, the fact of misadjustment is yet sufficient to cause pain. Such is the disagreeable quality of musical discords, glaring colors, unaccustomed muscular movements, etc.

Wherever, therefore, there is conscious feeling at all attaching to the adjustment of a sense organ, we may say that adjustment is pleasurable and misadjustment painful; a conclusion we would expect from our study of the development of the nervous system.

General Conclusion on Sensuous Pleasure and Pain. It now becomes evident that in the life process we have the *raison d'être* of pleasure and pain. But by life process we must be careful to include life development as well as simple life. The simple present life of an organism as con-

stant function is more than covered by the facts as we have observed them; pleasure and pain have a prospective future reference as well—reference to a fuller development and potential growth. Accordingly, sensuous pleasure may be defined as *the conscious effect of that which makes for the continuance of the bodily life or its advancement;* and sensuous pain, the *conscious effect of that which makes for the decline of the bodily life or its limitation.*

§ 8. Primary Conditions of Ideal Tone.

1. *Some degree of ideal change.* As physical pain arises from physical function, so higher pain comes with apperception considered as ideal function. And in general, the degree of ideal function, measured in terms of the emotional excitement to which it gives rise, indicates also the degree of pleasure or pain. Ideal change, the rearrangement of elements in the apperceptive content of consciousness, is accordingly the general condition of particular ideal tone

We may accordingly at once make use of the conception of sensuous tone already arrived at, substituting for the physical the apperceptive function, and for the adjustment of end organs, that of attention; and expect to find an adequate conception of ideal pleasure and pain. Accordingly we reach a second condition.

2. *The degree and duration of attention:* determining ideal tone as pleasure or as pain. Excessive concentration of the attention is painful; yet the pain is directly merged in the pain involved in the adjustment of the bodily organ. Prolonged attention becomes painful by the law of fatigue. On the other hand, moderate concentration and duration of attention are pleasurable.

3. *The degree of adjustment or maladjustment of the attention.* The conditions which involve distraction, or drawing apart, or doing violence to the attention, are painful; those giving feelings of ease, flow, variety, measured con-

centration, etc., are pleasurable. It is probable that the most pleasurable adjustment is that of finest and most exact discrimination. Ward formulates this and the preceding condition as follows: there is pleasure "in proportion as the maximum of attention is effectively exercised."

§ 4. Secondary Conditions of Ideal Tone.

The determinations already reached have evident application to those states of feeling which arise around acts of the attention regardless of the nature of the object to which the attention is directed. There are other emotional states, however, which are pronounced in their contribution to the tone of consciousness. The great expressive emotions (fear, love, anger), the sympathetic, the ethical, and æsthetic are all at times controlling agents of pleasure or pain. The question at once arises: Is it possible to bring them under the formulæ already enunciated? This question awaits an answer from the consideration of the conditions under which objects come to be pleasure or pain giving.

1. *Objects of perception excite pleasure or pain only as they have some present or future relation to our physical well- or ill-being.* Perception, as has been seen, is a summing up of sensations, in the form of synthesis. Now an object perceived gives us certain sensations only; but it suggests others which belong to the synthesis, and we are thus able to anticipate them. The sight of falling rain prophesies to me the unpleasantness of being wet; the sight of a lion, the pain of being eaten. The tone of perception, therefore, as far as it refers to the object, is intrinsically the prophecy of the tone of the sensations it includes and suggests.

To illustrate: a child first sees a fire (yellow light sensation), grasps it (touch sensation), feels pain (sensuous tone, due to damage to the life process). Again he sees the fire (perception, carrying in it touch and pain memories) and

has fear, which is of painful tone. The point advanced is that this latter tone, of fear, also has reference to the life process. It is nature's way of utilizing simpler pain experiences, just as perception is her way of utilizing sensational experiences.

2. *Representations of objects excite pleasure and pain only as the objects themselves excite them.* This covers the whole field of emotions which accompany reproduction—memory, passive imagination, illusions, etc. The emotions which such representations excite have qualitative coloring (expectation, dread, etc.), but their tone is again due, as the tone of perception is, to the anticipation of advantage or damage from the pictured object.

3. *The tone of the emotions which accompany conception and thought has reference both* (1) *to physical and* (2) *to intellectual well- or ill-being.*

(1) The reference of conception and thought to physical pleasure and pain is clear in some cases. My conception of the work of dentists, for example, has a painful tone which is as clearly a warning of physical damage as the perception of my particular dentist is. So, also, the science of dentistry, the logical framework of the art, considered merely as a branch of instruction, cannot be rid of its physical suggestiveness. The medical student grows faint when he hears his first lecture on blood-letting. Consequently, a positive part of the tone of higher æsthetic, ethical, and logical emotion illustrates the law of physical well-being.

In the case of æsthetic emotion, the element contributed by association is largely of this sensational character. Apart from the beauty of the purely sensuous in music, its associations are largely sensuous. A face often becomes handsome from association at the table, the theater, on the promenade, and the pleasure we take in it is a reverberation of these associated pleasures of sense.

(2) So far, it is clear, we may carry a naturalistic view

of pleasure and pain, conceding that, whatever purpose they may serve beside, all normal pleasures point to healthy, and all normal pains to unhealthy, physical functions. Does this exhaust the range of ideal tone? Further consideration convinces us that it does not. There are emotions whose tone seems to violate the law of physical well-being.

We would expect, if consciousness is a synthetic thing, and if its synthesis becomes explicit in what we call apperception or thought, that such a new thing in nature would have its own principle of development. And we would expect, further, that its development would be a matter of conscious adaptation to its conditions of thinking and willing. The most natural view of ideal pleasure and pain, therefore, is to consider it an index of healthy or unhealthy *mental* function. As physical pleasures, at first ministering blindly to the welfare of the organism, grow to attach to objects in relation to the organism; so ideal pleasures, while attaching still to attention as a function, yet come to attach to its objects as well. On this view, the tone of many emotions reflects the state of the mental functions primarily.

This view is supported by abundant evidence. The pleasures of intellectual pursuit lead their devotees to neglect the body and even to continue this course in the face of acute physical pain. Æsthetic delight is so independent of selfish motives that admiration is often called out by what is destructive and terrifying. Ethical emotion, with the happiness it always brings, may triumph over physical impulse, when they come into conflict. Consequently, we may hold that there is an element of hedonic coloring arising with the changes which occur in the content of consciousness. And we are led to define ideal pleasure as *the conscious effect of that which makes for the continuance of the apperceptive life or its advancement;* and ideal pain, *the conscious effect of that which makes for the decline of the apperceptive life or its limitation.*

§ 5. Final Conclusion of Pleasure and Pain.

Summing up all that has been said of pleasure and pain, both sensuous and ideal, we may conclude that *pleasure and pain are the affective coloring, respectively, which consciousness takes on in conditions of present or prospective well- or ill-being.*

And we have found three classes of conditions upon which pleasure and pain depend: first, physical conditions, giving sensuous tone; second, ideal conditions, giving rise to the tone of states of attention; third, a union of physical and ideal conditions, giving rise to the tone of the higher emotions.

Complexity of Tone States. It is now clear that the hedonic coloring of consciousness, at any time, is not a simple thing. Pleasure or pain is reported from the body and from the mind, from many organs of the body at once, and from many mental "moments" at once. Hope and fear may be struggling within, the will may be painfully paralyzed, attention distracted, and with it all, a beating sun may annoy, an aching tooth distress, and all go to make up a complex condition of tone. So mental and physical conditions may combine to produce pleasure; and all possible combinations may, and do, arise in kaleidoscopic order.

The elements, however, of this complex effect may be generally distinguished in consciousness. They do not coalesce except in their general tendency to produce emotional excitement, which has its own tone. If the two hands be held under two streams of water, very hot and pleasantly cool, respectively, the two hedonic effects may be clearly distinguished from each other. So the pain of suspense arises from the excitement of alternating hope and dread, and persists apart from the pleasure and pain of those emotions themselves as they struggle in consciousness.

CHAPTER XVIII.

NATURE AND DIVISIONS OF IDEAL FEELING.

Ideal vs. Sensuous Feeling. Is there an inner, or feeling, side to the world of ideas? Are we sensible of degrees of feeling in the phases of the apperceptive process? The simple answer of consciousness is, yes; and there is opened before us the great class of feelings called *ideal*. Ideal feelings, therefore, are *the modifications of sensibility which accompany the exercise of the apperceptive function.*

Ideal feeling is then, as Hodgson says, a new kind of sensibility accompanying a new kind of nervous process. The apperceptive function has its organic basis in some kind of a brain process which represents the combining of special centers in the hemispheres and the dynamic union of their energies. If the function performed by the attention is new, so also are the modes of mental excitement which attach to its different phases.

Ideal Feelings as Special and Common. The analogy of sensuous feeling serves us to indicate another distinction. Besides certain special feelings—sensations—which are brought about by the exercise of particular organic functions, we found a great fund of common sensibility—organic feeling—which seemed to belong to the living being as an organism. The motor feelings were found everywhere—the muscles being the most general outlet for the nervous process which brings feeling about. So upon an examination of the "feelings of ideas," we are able to make an analogous distinction. On the one side there are the *special* kinds of mental excitement, which are developed in connection with particular synthetic processes: memory yields regret, remorse, pride; imagination throws

us into expectation, hope, fear, love. Such states of sensibility we may call *emotions*. They are the special forms of ideal feeling just as sensations are special forms of sensuous feeling. But they do not exhaust the subjective element of this stage of consciousness. There is an undertone of feeling, a basis of sensibility, which is not disturbed during the mutations of the emotional life—feelings upon which all the emotions depend, feelings due to the fact of mental synthesis itself; such are the feeling of *reality*, feeling of *Interest*, etc. These we may call *common* ideal feelings. Further, all ideal sensibility would be expected to have tone, as pleasurable or painful. It will be profitable, accordingly, to turn attention to *common ideal feeling*, and to *special ideal feelings or emotions*; ideal pleasure and pain having already been considered.

COMMON IDEAL FEELING.

CHAPTER XIX.

INTEREST, REALITY, AND BELIEF.[1]

General Character of Common Ideal Feeling. The following aspects of feeling common to the intellectual processes may be profitably considered : *interest*, *reality-feeling*, *belief*.[2]

§ 1. INTEREST.

A general characterization of interest as a psychological state is best reached when we ask why it is that we act voluntarily in this way or that. The answer must invariably be, because we are interested in this course of action or that. As will appear later, the most important thing about interest is its quality as stimulating the will. A thing is interesting to me when, for any reason, it appeals to my attention—when it is worth looking at—when it is so related to me that I am led to investigate it ; and the feeling of interest is this need of looking, investigating, finding out about. A child is said to show no interest when he is entirely satisfied with his toy and leaves it.

Physiological Basis of Interest and Indifference. On an earlier page, when gathering up our conception of nervous function, we found reason to recognize two great laws, *i. e.*, the laws of *habit* and *accommodation*. And

[1] Cf. *Handbook of Psychology*, vol. ii, chap. vii.

[2] The feeling of *consent* or *effort* would naturally suggest itself also here as being one of the broadest aspects of intellectual feeling, but it comes up more properly under the detailed treatment of Will below. The feeling of *self* also cannot be adequately treated here, since it is so closely connected with the voluntary life ; yet as a matter of classification it should not be omitted from common ideal feeling.

occasion was taken to say of habit, that "psychologically it means loss of oversight, diffusion of attention, subsiding consciousness"; and of accommodation, that "psychologically it means reviving consciousness, concentration of attention, voluntary control—the mental state which has its most general expression in what we know as *interest*." "In habit and interest we find the psychological poles corresponding to the lowest and the highest in the activities of the nervous system."

Interest, then, is the most general awareness of the process of our intellectual life, and as such represents the highest and most unstable form of nervous integration. Wherever there is the nervous basis of attention and will, there is sufficient physical reason for the feeling of interest. And wherever, by reason of fatigue or disease, attention and will are not called out, the physical process is accompanied by the feeling of indifference, that is, there is then a reversion to a stratum of nervous structure and function which is dominated more by habit.

Intellectual Conditions of Interest. The general physiological analogies mentioned above lead to several presumptions which we find neatly confirmed by the psychology of interest.

1. Any reaction of consciousness which is repeated without variation becomes uninteresting; the nervous process passes from the stage of fresh accommodation to the stage of habit by the law of downward growth.

On the psychological side we may call this the principle of repetition, and say that *intellectual repetition diminishes interest.* We have only to understand a thing thoroughly to lose our immediate interest in it. Very few novels are worth reading a second time, if interest is the measure of worth. It is hard to get up interest in the departments of study which deal with descriptive details and statements of fact, and present no new openings for thought. The conversation of our maiden aunts, detailing the illnesses

and recoveries of our early childhood, no longer arouses our enthusiasm.

2. On the contrary, new relations are interesting; the nervous growth is "upward," involving higher integrations. Illustrations are not needed for anyone who has ever reflected on the passion for news, the course of rumor, and the delights of gossip for all mankind. This may be called the principle of *novelty*, and we may say that *the intellectually new is interesting.*

3. The contradictory of the feeling of interest is not indifference, but ennui, mental fatigue, boredom. Indifference means the reign of nervous habit, the draining off of energy in an accustomed channel. But ennui means the distaste that arises from interest in avoiding. It is a positive feeling as truly as is fatigue.

Interest of Discrimination or Exploration. These intellectual conditions may be set apart as contributing to interest of a particular sort—the interest of curiosity, of *exploration.* It is never realized in its purity, because emotional and other factors mentioned below come to modify the exploring impulse. But in a cold, calculating individual, who looks ahead and weighs the chances, these conditions are most marked. In early child life interest is almost altogether of the exploring kind. First, it is physical exploration; the infant explores his own body, then foreign bodies, his room, then adjacent rooms. The direction of his attention is largely accidental, depending upon casual stimulations. Then there begins a kind of moral exploration, the understanding of his own dress, toys, utensils, the fitting of things together, the meaning of facial and vocal expression. The exploring instincts satisfied, his interest is at an end.

This class of interesting experiences, however, belong to the more superficial, shifting, and variable side of one's life. They represent the come-and-go of the attention as we follow its quick responses. Purely intellectual interest

is, therefore, temporary; it does not attach itself firmly enough to its object to cause the latter to become one of our interests or goods. I am interested in the morning paper, the street sights, my afternoon drive, and the debating society; but to-morrow a set of new engagements carries my interest, and the experiences of yesterday, now past, only furnish one or two points at which my permanent life interests have been touched. What, then, constitutes more permanent interest, over and above the simple interest of the intellectual act of discrimination?

Emotional and Active Interest. So far interest simply represents a tendency to know. Its objects are mere objects that come and go indifferently to us; when we have learned what they are and how they act, our curiosity is satisfied. But bring them within the line of our *emotional* or *volitional* reactions, and everything is changed. Does their being what they are or doing what they do have any effect upon me? That is the vital question. The errand boy in an office carries fifty letters a day to his employer, and they have no interest for him; he knows them to be letters for X. Y. Z., and his curiosity is satisfied. But let one letter come to himself, and then not the words it contains or the love it brings interests him alone; but the envelope, its sides and corners, the stamp, the address, the very odor of it, fairly burn him with their interesting aspects. Anything, in short, gets interesting which has, besides its relation to other things and people, a power to make me feel and act. I may know the presence of a thing and not be interested; but I cannot *feel* its presence, and much less can I *act* upon its presence, without coming to think it to be worth my close attention. And such emotional interest seems to arise in different circumstances, as follows:

1. Whatever directly causes me *pleasure or pain* excites interest. Here the reference to self is so immediate that the knowing function which the attention brings with it is simply a self-preserving function. I am interested in pain

to discover its cause and remove it, and in pleasure to understand and continue it. This is what pleasure and pain are for, to warn and advise; and to say they interest us is only to say that they carry this function into the life of thought.

The feeling of interest, therefore, seems to be an added thing to the pleasure and pain tone. It arises in connection with the apprehending of the tone and its causes. We would hardly say that an oyster is interested when a sharp instrument is thrust painfully between his shells. The intrusion affects him, and it is in his interest to avoid it; but it is truer to say that it hurts than that it interests him. Circumstances can be conceived in which pleasure and pain would lack interest; as, for example, the pain of an incurable physical trouble or a preying mental anxiety; such pains are understood and endured without any but the negative interest of the endeavor to forget them.

2. Equally original is the interest aroused by our volitional life. Ordinarily we act in reference to a thing because we are interested in it, which means because we are impelled by intellectual or emotional interest. But it is still true that, after acting, our interest is greater than before. Any effort expended on a thing makes it more worthful to us. The reader may have only the interest of courtesy in a new method of shuffling cards or of holding his pen; but after one effort, his growing interest will lead him to new endeavors. Again, even when there is at first no thought of a thing, tool, utensil, etc., and it is used only as a means to a more distant end, interest will gather around it for itself after long use. Who does not part, with an interest which is positive pain, from an old pair of shoes or his last summer's straw hat? The increase which accrues to interest by sharing it also illustrates this volitional and emotional element. Sharing is the result of the emotion of sympathy, and proceeds by action.

Here, again, it may be remarked that the interest attaches

to the object, not to the activity, except in early child life, when movements are themselves objects of interest. But it attaches to the object *because* it is related to *my* activity. No one's else exertion arouses my interest in the same way.

Interest of Custom or Habit. Very slight self-observation is sufficient to show that while repetition diminishes the temporary intellectual interest spoken of, it is still often through habituation that real interests are formed. There is a distinct line beyond which the customary ceases to be tiring and becomes interesting. Before this line of experience, things are faded and washed out; but as we grow accustomed to them, we begin to find ourselves expecting to find them, relying upon them, appealing to them with an interest born simply of old acquaintanceship.

It is undoubtedly through this principle of custom that some of our deepest life interests are generated. We grow to think of ourselves with certain accessories which have always accompanied us. So a business man's interests narrow down to his business, because all his habits bear upon it. A man of college culture loses his interest in literature and science because his regular routine in after-life does not include such subjects. We become interested in certain classes of people because we are thrown with them. The cure of unfortunate love is separation, and the hope of an unsuccessful suitor lies in the art of keeping himself and his proposals in the mind of the woman he hopes to win.

Definition of Interest. A thread of common value may now be detected running through the complex phenomena of interest. Objects are interesting only as they affect us or are associated with objects that affect us. And by the phrase "affect us," we mean—work some change in the sensibility, which tends, by the law of motor-reaction, to realise itself in activity. Given such a modification of the affective consciousness, and interest invariably arises.

Now, such affective modifications may come in two ways. The two great stimuli to activity are pleasure and pain on the one hand, and suggestion on the other.[1] Suggestion is passing, shifting, temporary; the interest it arouses is intellectual, temporary interest. But pleasure and pain, in all their range, represent the constitutional and permanent; as stimuli to movement, they are recurrent. And the interests they arouse are the deep-seated life-interests already examined.

The common element, further, is an impulsive element—a tendency element—realizing its object through the attention. Accordingly, in view of all that has been said, we may define interest as *impulse to attend*. And since it is in the attention that all mental synthesis takes place, we may say, as an alternative statement, that interest is the *consciousness of a tendency to think*. The amount of interest an object or topic will have for us at any time is the amount of *calling out force it exerts upon the attention, both by direct suggestion and by association*.

Interest as Ideal Emotion. Consideration, therefore justifies the view that interest is the subjective side of the apperceptive function. Habit diminishes interest because it diminishes the intensity and energy of presentative construction; but habit begets interest because it makes deep and strong the lines of associative or representative construction. By repetition, simple suggestions lose their force; but by repetition the moving principles of our nature gain force as stimuli to the relating process of attention.

§ 2. Reality-Feeling.

Distinction between Belief and Sense of Reality. Without entering at this point into the grounds of the distinction, two different sorts of feeling may be denoted by the terms *reality-feeling* and *belief*. The phrase reality-feeling denotes the fundamental modification of conscious-

[1] See below, chap. xiv.

ness which attaches to the presentative side of sensational states—the feeling which means, as *the child afterward learns*, that an object is really there. By the word belief, on the other hand, we may denote the feeling which attaches to what may be a secondary or representative state of mind, and indicates the amount of assurance we have *at the time* that an object is there. The idea to which the reality-feeling attaches, may be said to have its own guarantee of its reality; it is a *given*, and my feeling of it is direct acquaintance with it. But the idea to which belief attaches is guaranteed by some other mental state, by what I know about it, or by its connection with ideas already guaranteed. This distinction and its bearings will become clear as the exposition proceeds.[1]

Rise of Reality Feeling. The dawning consciousness of a child—passive consciousness, as it has already been called—is filled with affective sensational happenings. All it has at first is feeling, and feeling of one kind. This feeling has no meaning whatever; for by meaning we mean interpretation in terms of something else, and there is nothing else. The flash of light, the muscular sensation, the pain, each is simply *this*, an experience. There can be no distinction corresponding to reality and unreality, inner and outer, subject and object, presentation and representation.

Reality-feeling, therefore, at this early stage, is simply the fact of feeling; nothing more, but this much. Existence is simply presence; but presence is existence, and whatever is, in consciousness, is real.[2]

[1] To the mind of the writer this distinction is a fundamental and vital one. Yet it has, so far as he knows, been made nowhere in psychological literature.

[2] In dreams the simple reality-feeling is present without belief, as is proved by the fact that the grossest inconsistencies are accepted. This simply shows that consciousness has lost its questioning attitude altogether—belief as such does not arise; but reality is there in its full strength.

Rise of Unreality-Feeling. Further, the early consciousness soon experiences something quite different from this feeling of presence. As soon as appetite and impulse assert themselves, they are felt—indeed they make the keenest demands upon the early sensibility. As we adults look at it, it is a feeling of lack, want, need; but to the infant it is simply a feeling, and a new one. But this new feeling must very quickly get connected with the reality or presence-feeling: say the sensation of the white surface and warm touch of the milk-bottle, as following upon the lack of food. In other words, a simple presence-feeling becomes connected with a simple *absence*-feeling. As a matter of fact, the two come together, and it is perhaps the earliest felt distinction in the infant consciousness—vague hunger-feeling, presence-feeling of taste and touch, absence-feeling when the supply is cut off. This absence-feeling is the first and original *unreality-feeling*.

Closer examination again shows us that this unreality-feeling has nothing to do with a negation of belief—with doubt or hesitation, the true negation of belief. If the sense of unreality arose as a contradiction of the sense of reality, there would be some justification for this view. But in that case we would not have a sense of unreality, but a sense of the reality of a new and contradictory experience. For example, the early consciousness has a single candle before it—a reality-feeling. Suddenly the candle goes out. Darkness is now a new reality-feeling. A memory of the candle persists and conflicts with the present darkness, and a new feeling arises—doubt, perplexity—the foundation of belief, as appears below. But the unreality-feeling has an entirely different origin—in our active impulsive nature. It comes before there is any conflict, and lingers after such a conflict, distinct from the feeling to which this conflict gives rise.

Degrees of Reality and Unreality-Feeling. Both of these original forms of feeling must have degrees. Not

only to the child is the reality of food more intense and consuming when it is hungry than when it is filled, but to the mature man there are realities and realities. Everyone of us has his true reality, his real and eternal as opposed to his unreal and temporal. Even external things sometimes seem to bruise and wound us, so hard and stubborn does their reality become; and again, all the world seems thin, flimsy, and unsubstantial. We believe many a fact of which we fail to get a "realizing sense." Simple conditions of the nervous system derange our sense of reality; and emotional conditions suffice to infuse body into our life experiences or to render them ghosts of profitless pursuit. Confining ourselves, however, now to the infant's life, we may say that his most vivid realities are those sensational states which satisfy his appetites and needs.

Physiological Basis of the Reality- and Unreality-Feeling. The organic basis of these feelings, it is easy to see, is nothing more nor less than the organic basis of consciousness itself. Any sensory process has its feeling of reality element, and any tendency to movement has its unreality-feeling, succeeded by reality-feeling, in the sensory process which satisfies it. Further, the feeling of need must arise from a lack of sufficient stimulation in the sensory seat, which lack is itself a stimulus to the motor process by which the lack is supplied; the connection between the two processes being fixed by heredity and experience.

Looked at more broadly, here is an organism in a world of environing conditions; a certain sensational process represents its best life among these conditions. When it fails of this normal sensational process, its very lack is a stimulus to a motor process by which the normal sensational process is re-established. Assuming this normal sensational process, whatever it may turn out to be, let us call it the *sensational coefficient*. By this phrase is then meant the element of nervous activity which, being present,

gives a sensation; over and above the activity which gives a memory-picture or arouses an impulse. The sensational coefficient is the activity which is regularly aroused by a real object.

In this feeling of reality we find the mental "predisposition to illusion" referred to in a previous chapter.[1] If the presence of the sensational coefficient gives "real" coloring to a conscious state, then, whenever this coefficient is present, reality is reached. But if, by reason of undue excitability from disease, emotion, expectation, or other internal causes, this coefficient is artificially brought about when no reality corresponds, then illusion results.

Our general outcome so far is, accordingly, this: *the feeling of reality is simply consciousness itself; it is most vivid when it accompanies a nervous process having the sensational coefficient. The feeling of unreality arises in connection with appetites and impulses which result from the absence of the sensational coefficient in particular sensory brain seats.* This may be called the first stage in the development of the consciousness of reality.

§ 3. Belief.

The feeling of belief is a feeling which attaches to the representative faculty primarily. It is only when memory and imagination come to bring up rival candidates for our acceptance that we believe or disbelieve. The foregoing discussion suffices to show that something else must be added to the simple feelings of reality and unreality, as these arise in connection with sensations, to constitute true belief. The question of belief, put most broadly, is this: Why is it that, of two images which come into my consciousness, I discard the one as an imagination, a phantasm, and accept the other as a memory or a present fact?

Doubt Precedes Belief. It was said above that the unreality-feeling comes in cases of appetite, to oppose the simple reality-feeling of presentation or memory. The

[1] Above, p. 194.

reality-feeling doubtless attaches at first to a memory of a candle as to a real candle, and nothing contradicts it. But, with other memories, this reality-feeling is rudely disturbed. The memory of food suggested to an infant by vain sucking at an empty bottle no longer has the reality-feeling. Unreality takes its place. So certain memories get labeled as unreal. And it is the *discovery of this possible unreality*—the discovery of the possible absence of the sensational coefficient, as the impulse-satisfying thing—this is the beginning of doubt.

That this is not theoretical only is proved from the observation of young children. They have implicit confidence in everything at first, but soon a stage is reached of hesitation and doubt. Unaccustomed things have so often brought pain that the new—the strange face, the unusual expression of a familiar face, a new room, a new plaything—are treated cautiously and with manifest distrust. The question is: Can I trust the new image to satisfy my impulse toward it?

Development of Doubt. As the rise of doubt is due in child life to the failure of a state to *satisfy*, to the absence of the sensational coefficient, so all higher doubt can be traced to like conditions. I doubt an image, a statement, a law, because it does not meet the demands that I have a right to make of it if its claim be true. Just as there is a sensational coefficient, so there is an æsthetic coefficient, a moral and an intellectual coefficient—that quality in each of these fields which satisfies the demands of my nature in these directions severally. I doubt that a face can be called beautiful, because my æsthetic sense is not satisfied with it. I doubt whether tuberculine cures consumption, because my logical sense is not satisfied with the evidence; and so on everywhere.

There are a great many things in our lives which never pass into the stage of doubt or belief at all; things which remain under the rule of the simple sense of reality. My

mother's love, for example, is a thing in which I cannot be said to believe. It was one of the first realities of which I became sensible. My reality-feeling in reference to her has never been disturbed one way or the other, and so it has remained undoubted and unasserted. So it is with the religious truth in which one is reared. It is a shock to the sensibilities to ask the question, Do you believe? for the first time; it suggests the possibility of doubt, and puts us under the necessity of turning simple reality into grounded belief. But of other people than my mother—my books, say; and of other truth than religion—my history lesson, say—I make certain demands, and condition what is truly belief upon the way these demands are met.

Resolution of Doubt. As doubt arises from the attitude of mind toward a new image, so doubt is resolved by an actual resort to experience, as far as that is possible. In the case of sensible things we try and see whether the image have the sensational coefficient. If the child has once been fooled by an empty bottle it doubts the bottle at its next appearance; but its method of testing it is always the same: it tries it. Does it get the needful sensation?—then reality is here; if not, then not. In all kinds of belief there are such tests, as appears more fully below.

Nature of Belief. Now the feeling which follows in every case is a feeling of *resolved doubt*; it is not the simple feeling of reality which prevailed before the doubt, or of unreality as unsatisfied need. It is a larger, freer, fuller state of mind. It is *belief* and *disbelief*, or better, positive belief and negative belief; for the two are one state of mind. And the opposite of belief is doubt, as has been seen.[1]

One only has to question himself with ordinary care to

[1] The word belief is hereafter used to cover both belief and disbelief, the latter being equivalent to belief in something which negates that which is disbelieved.

find the truth of this result. The very word belief brings up suggestions of uncertainty. The mental side of this state cannot be separated from the inheritance of associates which swing down the tide of consciousness to attach themselves to it. As long as I am unaware of the real force of a thing, its sensational, emotional, or convincing property, I simply let it pass. There are thousands of things about us, social conventions, red tape enactments, customs of dress and daily habit, which I conform to because they are not worth the trouble of a more serious attitude of mind. But what I believe has its *pros* and *cons*; and however vaguely, still really, I am better satisfied with the *pros* than with the *cons*. Now, for the first time, therefore, we have belief. And from the foregoing its conditions are more or less plain. Of belief in sensible things we may say *it is a feeling of confirmation and security over and above the feeling of simple reality*. It is the distinct feeling of ratification which I myself give to reality by being satisfied with it. I consent to it. Without anticipating details which are not necessary here, sensuous belief, and, by implication, all belief with it, may be defined *as consciousness of the personal endorsement of reality.*[1]

Reaction of Belief on Reality. This may be called the second stage in the development of the consciousness of reality; the simple reality-feeling has passed into belief. Belief then becomes the test of reality. We turn back ruthlessly upon all we have accepted and see whether it will stand the tests of reality at this second stage; whether it is meeting the full demands which our credence makes upon it. Realities to me then become what I believe, and what I believe is what meets the requirements of my life.

[1] On the relation of Belief, as thus defined, to Judgment, see my article "Feeling, Belief, and Judgment" in *Mind*, N. S., vol. I. p. 403.

Kinds of Belief. Broadening our outlook we are able to distinguish several aspects or phases of this feeling, which we may call respectively *belief in the external world, belief in memory, logical belief, belief in ideals, etc.* The general theory already set forth leads us to see that in each case there must be an impulse or tendency to a particular kind of experience, and that the reality of that experience must depend upon its capacity to satisfy the tendency involved. Calling in each case this ability to satisfy the "coefficient," we have as many coefficients of reality as there are fundamental tendencies of our nature.

§ 4. Belief in External Reality.

Its Coefficient. A few more words may be said about external reality as contrasted with the other kinds of reality in which we believe. The question suggests itself: What in consciousness is the sensational coefficient? Granted such a nervous process whenever a real object is present, what mental changes does it work?

We are now able to call upon the determinations already made in regard to the grounds of illusion.[1] The grounds of illusion must be the marks which give the semblance, the coefficient, of reality. Most generally speaking they are two; first, *very high intensity*, and second, *uncontrollableness*. Whenever a mental state is intense, be it sensation or image, and resists all endeavor of ours to modify or banish it, it carries our belief, it is real, as far as sensational tests are concerned, *i.e.*, as far as the sensational coefficient goes. I may have often grounds for distrusting such a state, other coefficients which I invoke as of more worth to me in deciding the case than the sensational tests; but if I had only the latter, if I were merely a being of sensations and reactions, intense persistent states would always and invariably sum up reality for me.

Of these two elements of the sensational coefficient the latter is more important and essential. Simple reality-

[1] Above, p. 194 ff.

feeling attaches to intense and feeble images alike, provided no impulse arise which fails to find its satisfaction in the feeble ones. But in the element of uncontrollableness we have a confirmation of the impulse origin of all belief. Our impulses, our life needs, are fixed and permanent, not subject to our will or control; so are their satisfactions, the realities we have reached in our life experience.

Primacy of Muscular Sensations as Giving External Reality. In an earlier place,[1] touch—with muscular sensibility—was called the "controlling sense," because questions of reality are referred to it for decision. We now see why this is so. It is through muscular movement that will and impulse and appetite, that all outgoing processes, are realized. If natural satisfactions, therefore, are the basis of belief in external reality, then the medium of such satisfactions must be the medium also of the sense of reality. And further, motor-reaction is itself an impulsive, original thing, and takes place largely through the stimulus of resistance; consequently the presence of resistance is itself the gratification of the need of motor-development—perhaps the most general and fundamental sensational need that we have. If we could get satisfactions without muscular sensations, then the latter would not be the tests of external reality.

Primary Criterion of External Reality. Consequently it is only what we would expect that sensations of *resistance* become the primary criterion of all external reality. Anything that resists my will is believed to have present reality. And it is not simply resistance through contact, but, by generalization, resistance in any of the classes of sensation. A stifling smoke resists my will to be rid of it, that is, the physiological effort I make to banish it shows me that I have no control over it.

[1] Above, p. 68.

§ 5. Belief in Memory.

The Memory-coefficient. By memory-coefficient is meant the coloring of reality which some images have, as representing former states of consciousness: that by which I distinguish a memory from a dream or a creature of the imagination. In general terms, it is the question of recognition over again: belief in memory is the feeling which attaches to images recognized; and as recognition has been seen to rest in the sense of diminished expenditure or easier adjustment of attention involved in the reinstatement of a content in apperception, we have here a sufficient statement of the intellectual conditions of the feeling of memory-reality.[1]

As feeling, however, two very distinct forms of reality-consciousness attach to memory: first, what we may call the simple sense of revival or recurrence, and second, the belief that what is thus recognized was itself a real objective thing when it was first experienced. I may remember a dream, recognize it, and believe in it as truly a memory, and yet be in doubt as to whether it was a dream or a real occurrence when I first experienced it.

The memory-coefficient of belief attaches properly only to the first of these states: it answers the question, What shall I recognize? The further point of feeling—that which attaches to the answer to the question, Is what I recognize a reality?—requires further inquiry into the nature of the memory in question. Does the memory recognized include memory of the sensational coefficient? Did I believe it to be a real object when I first experienced it? This question determines whether I shall feel it to be the memory of an objective thing or no. So with any other of the higher kinds of reality-coefficients yet to be spoken of. Do I recognize a former image of a beautiful face? Yes; but do I recognize it as a living beautiful face? That depends upon the kind of coefficient, sensa-

[1] Above, p. 159 ff.

tional, imaginary, æsthetic, etc., of my earlier view of the face.

Memory-coefficient Proper. The question then, Why do I recognise anything consciously at all? has its answer in the memory-coefficient proper, viz., *because I can reproduce it voluntarily by starting a chain of associations leading up to it.* I have control over it in this sense, that it is at my command for reproduction. My past is mine only in so far as I can utilise it in my present. I refresh my memory by rehearsing details, and thus bringing up points which, if simply suggested to me without their earlier connections, I might have failed to recognise. So we reach two kinds of present reality; present external reality, guaranteed by its independence of my will, and present memory reality, guaranteed by subjection to my will.

Completed Criterion of External Reality. Besides the primary criterion of external reality found in feelings of resistance, a secondary criterion is, therefore, supplied by memory. Of the two kinds of memories, both having the memory coefficient, those which represent external realities and those which do not, the former are important factors in the development of our idea of the world without. Among the trains of association by which memories may be voluntarily brought up are certain muscular trains, themselves accompanied by memories of resistance, and the memories brought up by *them* are also so accompanied. It is *only* these muscular resisting trains terminating in a resisting experience which carry belief in external things remembered. For example, I remember equally a merman and a salesman. I can get the shopman again as a present (resisting) reality by reproducing the series of muscular (voluntary, but resisting) sensations required to revisit his shop. But I can only get the merman as an image (unresisting) by a train of ideal (voluntary, but unresisting) associates. The former alone I do and must consider externally real. The secondary criterion of external reality, there-

fore, is my ability to reinstate resisting experiences at will.

In this secondary criterion the element of permanence included in our idea of external things seems to take its rise. In saying things are, we mean also that they continue. That is, as we have seen, we mean that we are able to go and find them again, and find them with the same resistance they showed when we experienced them before. To a creature without memory reality would be simply resistances got successively; but with memory as recognition comes also persistence.

The history of opinion regarding belief in objective things shows that the twofold nature of the complete criterion has been generally overlooked.[1]

§ 6. Belief in Concepts and Thoughts.

Thought-Coefficient.[2] In conception we pass from the simple reproduction of experience to the abstracting and generalizing function of apperception. Conception, judgment, reasoning, have been already described as the successive efforts of consciousness to maintain identity throughout the diversity of new experiences. The fundamental movement, therefore—what we may call the logical impulse—is to secure identities or partial identities, resemblances, consistencies, in its content. The demand of thought in general is agreement, consistency; its opposite is contradiction: this it cannot abide and be satisfied.

Consequently consistency, the absence of presentative or conceptual contradiction, is the thought-coefficient of belief. Where no other coefficient conflicts, mere consistency carries intellectual assent. But by intellectual assent, it

[1] Cf. the writer's article "The Coefficient of External Reality" in *Mind*, xvi, 1891, p. 389. Also see the references to recent discussions given in my *Handbook of Psychology*, vol. II, p. 166.

[2] Compare the whole of chap. xv. above, and also chap. xiv. in my *Handbook*, vol. I.

must be carefully noted, is meant formal assent, logical assent, indifference as far as the logical impulse is concerned. As to the belief in the objective truth of concepts and judgments, the reality of their content, that is a farther question.

§ 7. Emotional Belief.

No detailed argument is required to show that strong emotion has an influence on belief. So evident is this that the emotional method of persuasion is universally recognized. An idea which strongly excites us to some definite emotion, hope, fear, anger, love, is easily believed in, and the cherishing of the emotion is a means of intensifying conviction in reference to its object.

The emotional coefficient, therefore, consists, like the sensational coefficient, in *intensity* and *uncontrollableness*. While mere intensity does strengthen conviction, yet it may be questioned whether it is not mainly because it is through intensity that we lose control. As soon as we can get our emotion under our will, and can say to ourselves, "think calmly," the distorting influence of feeling disappears.[1]

§ 8. General Conclusion on Reality and Belief.

The consideration of the different coefficients of belief leads us to conclude that there are as many kinds of reality. There is moral and æsthetic reality no less than logical and sensational reality; and there is the same reason for believing in one that there is in another, for both rest upon the fact that our mental nature demands certain kinds of satisfaction, and we find it possible to get them. Sensational reality will not satisfy our logical demands, for nature is often refractory and illogical. Neither will logic satisfy our moral and æsthetic demands, for the log-

[1] On the grounds of our moral and æsthetic beliefs see below, chap. xxi, §§ 6, 7

ically true is often immoral and hideous. It is well, therefore, to write large the truth that logical consistency is not the whole of reality, and that the revolt of the heart against fact is often as legitimate a measure of the true in this shifting universe as is the cold denial given by rational conviction to the vagaries of casual feeling.

Composite Realities. The outcome of our life of belief is the more or less complete adjustment of these kinds of reality to one another. We find ourselves constantly denying, minimizing, scouting the external world, as we abstract our higher selves from connection with it. Idealistic philosophy is a revolt from the sensational coefficient in the name of the moral coefficient, however logical a system of belief it claims to be as philosophy. Materialism, on the contrary, is the worship of the sensational coefficient as more real than any other. Religious truth either tells us which to put under and which to embrace, or bids us await a future state when all the demands upon us will be harmoniously adjudicated.

What I, as an individual, therefore, believe is a composite thing, a mixture of truths representing the degree of harmony I have succeeded in reaching among things, which, taken singly, I am obliged to accept. Among them the largest place is given to external or sensational reality. I bring things wherever possible to the test of sensation. No doubt this is because my connection with the external world is most intimate and direct, and the penalties of its disregard are most quick and sure. Next in practical importance is the world of logic or demonstrative truth, which holds its sway imperatively when sensation does not vote a negative. The disregard and violation of æsthetic, moral, and religious truth are due to the difficulty of deciding just what these coefficients are, and of disentangling them from the swarm of temporary emotional states which have not the same claim to satisfaction.

Self the Ultimate Reality. Amid the variations of

composite reality the most fixed point of reference is now seen to be the feeling of *self*. This is as far as psychology can go with its analysis of reality. All reality is given us through our own experience, and the center of experience is self and its needs.

Existence. There are, moreover, as many kinds of existence as there are coefficients of reality. We have already seen that judgment involves belief in existence of some kind, but not always external existence. It may be mere mental existence (imagination-coefficient), as in the world of fiction and mythology; or ideal existence (æsthetic coefficient); or logical existence (thought-coefficient), as belief in a hypothesis; or it may be what we call "real existence" (sensational coefficient), belief in external reality. And things are constantly passing from one of these kinds of existence to another. We learn that we had mistaken the coefficient. Santa Claus passes from real existence to imaginative existence; disembodied spirits in the minds of some undergo the contrary change in the manner of their existence.

Relation of Belief to Will. If the foregoing theory of belief be true it is evident that belief is not the feeling of effort or volition. It is a feeling of willingness or consent, but not of will. I often consent to reality against my will. My consent to reality is a forced consent. The effect of will upon belief is really the effect of voluntary attention upon one or more of the coefficients already mentioned. Attention may intensify an image and so give greater sensational or emotional reality. It may also dwell upon and bring out certain relational connections of an image and so throw the logical coefficient on the side of those connections: it may refuse to dwell upon those relations which are distasteful. But it is not true that we can believe what we will. To say we believe what we need is not to say we believe what we want.

Definition. Belief was above defined as the *conscious*

ness of the personal indorsement of reality. Reality we have now found to be a general term for *that kind of experience which satisfies one or more of the needs of the individual.* *Belief in anything is, then,* put most generally, *the consciousness of the presence of that thing as fitted to satisfy a need:* and it is distinguished from the earlier unreflecting reality-feeling, which is *the simple consciousness of a presence.*

Interest and Belief. A further interesting question is the relation of these two states, considered as ideal feelings, to each other. Interest is the feeling of an impulse to attend aroused by an object; belief is the feeling of the presence of an object fitted to satisfy this and other impulses. Interest has a distinct future or prospective reference. If my future were forever cut off from an object my interest in it would die away as soon as the image of it became so faint and infrequent as not to arouse a strong impulse. But, however thus cut off in the future, I would not lose my belief in such an object: for the memory-coefficient of it would last as long as memory itself, and with it the peculiar coefficient of the object's own reality. Belief, therefore, has a retrospective reference. Interest must be perpetually renewed by new impulse, new apperceptive activity; belief can only be destroyed by experience which compels me to conclude that it was at first misplaced. The points of similarity between the two feelings are that they both terminate on an intellectual object, and both arise in connection with an impulsive mental outgo.

SPECIAL IDEAL FEELINGS.

QUALITY, OR KINDS: EMOTIONS.

CHAPTER XX.

DIVISION: PRESENTATIVE EMOTIONS.[1]

§ 1. Division.

General Nature and Characters. Special ideal feelings or emotions have already been given their place among the phenomena of sensibility. They are the feelings which arise in connection with different phases of intellectual activity, as far as these feelings stand clearly distinguished in consciousness from one another. They are qualitatively different (hope and fear, for example), as sensations (sound, taste) are qualitatively different.

Besides distinctions of *quality* among emotions we are able also to predicate of them *quantity* (or intensity), *duration* (time relations), and *tone* (pleasure and pain), reaching the same four characters which we found to be present in sensations.[2]

Kinds. Upon examination states of ideal sensibility fall into two classes, which may be called respectively emotions of *activity* and emotions of *content*; *i. e.*, first, feelings *of* the operation of the apperceptive function without reference to what it operates upon; and second, feelings excited by the particular object upon which the

[1] Cf. *Handbook of Psychology*, vol. ii. chap. viii.

[2] Above, p. [illegible].

intellect operates. These classes of ideal feeling suggest themselves for separate treatment.

§ 2. Emotions of Activity.

It has already been seen that all mental activities reside, that all apperceptive processes happen, in the attention; hence the great class of emotions of activity cluster round the different phases of the attentive life. These feelings again fall into two classes, which we may call feelings of degree of *adjustment* and feelings of *function*, or activity proper.

Emotions of Adjustment. It is an easy matter to get these feelings experimentally. Attention to successive stimuli—say sounds—following one another in very rapid succession soon grows painful as a feeling of *distraction* or *confusion*. The attention cannot adjust and readjust itself in time to bring order into its stimulations. On the contrary, when there is an even-measured flow in the appeals to which the attention is open, we have a class of feelings of *abstraction* or *clearness*. Again, a stimulus may be so slight, vague, dim as to lead to violent concentration upon it, giving feelings of *contraction* or *effort*; and again, we often have the consciousness of unusual breadth of view, comprehensiveness of range, *expansion* or *ease*.

Emotions of Function. Although the line of distinction is inexact this class of emotions is conveniently separated from the foregoing. They are feelings of the apperceptive process, as far as it is felt in operation; still, however, apart from the nature of the particular object of its operation. The going out of the attention may be felt as *freshness*, *triumph*, *eagerness*, *alertness*, *hope*, *courage*, *aspiration*, *elation*; or as *hesitation*, *indecision*, *anxiety*, *timidity*, *melancholy*, *irritation*, *fear*. The former of these classes may be known in general as emotions of *exaltation*, and the latter as emotions of *depression*.

§ 3. Emotions of Content, *i. e.*, having Reference to Objects.

Perhaps the most convenient, as the most evident, division of these emotions is based upon distinctions among their objects, as regards the kind of belief-coefficient which they involve.

Proceeding on this plan we may distinguish *presentative* from *relational* emotions, and under the presentative order we find, first, a great class which refer exclusively to self, terminate on the ego; for example, pride. These we may call *self*-emotions, after analogy with the more affective kinds of sensation, which, it will be remembered, have most direct value as reflecting the subjective side of sense experience. Another class under the presentative type depend upon the relation of the object of the emotion to one's self, as fear, etc. These we may call *objective* emotions, after analogy with the knowledge element in sensation. Relational emotions, on the other hand, terminate upon objects which have certain complexities in themselves apart from their connection with the individual. The presentative emotions carry belief in the sensational or memory coefficient; the relational, in the logical coefficient.

Further, under the objective emotions, we may distinguish the *expressive* from the *sympathetic*. The former indicate a reaction in consciousness outward as an expression of personal feeling; and the latter indicate a similar reaction, which is now sufficiently described by the term "sympathy." Again, feelings of relation fall into so-called *logical* and *conceptual* feelings.

The divisions thus indicated may be presented to the eye in the following table:

Emotions of Content	Presentative	Self	
		Objective	Expressive
			Sympathetic
	Relational	Logical	
		Conceptual	

§ 4. Self-emotions.

The emotions which terminate on one's self must be clearly distinguished from the feeling proper of self. The feeling of self underlies all other forms of consciousness when self-consciousness has once arisen. Assuming this to be so, whatever self may be, we find that the contemplation of self, when it becomes the object of our reflection, arouses certain spontaneous and peculiar forms of emotional excitement. These are the emotions of self.

Such emotions attend either an exalted estimate of one's own person or possessions, or, on the other hand, a depreciatory estimate. The former we may call emotions of *pride*, and the latter emotions of *humility*. Looked at casually, emotions of pride include the states ordinarily called *pride, vanity, haughtiness, conceit, superiority, complacency, arrogance, self-confidence, forwardness*, etc , and under emotions of humility we have *humility, modesty, self-debasement, self-distrust, inferiority, bashfulness, meanness of spirit, weakness, poverty, shame*, etc.

In different individuals these emotions have habitual stimulation in very varying circumstances. One vainglorious mortal dwells always upon his past exploits; another, on the mighty deeds he is going to perform. One humble spirit bears always in mind the weakness of his earlier or present endeavors; another lives in constant dread that an occasion will arise in which his real shortcomings will become evident. Moreover, besides the common object, of them all, self, viewed in a narrow sense, these emotions attach very broadly to anything in which one's interest is wrapped up, or for which he is in any way responsible. Without discussing the question as to whether the extent of these feelings justifies our extending the notion of self to include all the objective personal interests of the man, it is still true that his self-feelings overflow, as Hume maintained, and attach themselves to all objects with which

he is closely and habitually associated. A man grows proud of his college, his boarding house, even of the valor of his enemies; ashamed of his associates, of the shabby dress of his grocer, of the venality of his political adversaries. Give me a real interest in anything whatever and it becomes mine in an emotional sense: its fate affects me in the same way, though not to the same degree, as a similar fate to myself.

§ 5. Objective Emotions.

The *objective* emotions are so called to indicate that they arise in the presence of an object; as feelings they are subjective states, but they arise as differentiated qualitative states; and this differentiation seems to depend in some way upon the relation of self to the objects which excite them respectively. But the idea of self, as itself an object presented in relation to the thing on which the emotion terminates, is not necessarily present. Children show fear, anger, etc., before they have the notion of self. The object of the emotion does sustain a relation in adult conception to self, and the emotion which is purely instinctive (presentative) at first, thus becomes *reasonable* (representative). But the fact that the same emotion may not have a conscious self-reference shows that such a reference is not one of its essential conditions.

§ 6. Expressive Emotions.

These emotions, farther, find their place in the reactive consciousness, as both the study of children and adult reflection teach us. They rise in child life before volition becomes prominent. Consequently the phrase *expressive* emotion serves best to distinguish them. They are an expression of the reaction or behavior of consciousness when given objects are presented. They represent the reactive, outgoing side of consciousness, as the affective emotions or feelings of self represent the receptive or reflective side.

Looked at from this point of view, emotions rest upon impulses, and exhibit the two great directions which appear in impulse, *i. e.*, toward or from an object as fitted to satisfy, or the contrary. Careful distinction in terminology —more careful and exact, no doubt, than the facts warrant —gives over the active, impelling factor in a state of high emotion to impulse, and reserves for emotion only the mental excitement, agitation, felt disturbance of consciousness. This, at any rate, serves to cover both aspects of the case, and gives us a terminology which may be consistently maintained.

Having in view, therefore, the direction of the impulses which the expressive emotions accompany, we may distinguish emotions of *attraction* from emotions of *repulsion*.

Emotions of Attraction. Under the general head of attraction we may include all tendencies toward an object or individual, or satisfaction in its presence, from the slight feeling of approval to the boisterous expression of social enjoyment, or to the quieter but stronger movings of affection and love. And the progress of this emotion in degree and closeness of attachment is an interesting and typical chapter in the natural history of feeling.

Beginning with interest—the emotion of simple attention—an object becomes attractive as it comes into clear relation with one's self. Both simple association, by the egoistic reference already remarked upon, and increasing knowledge of attractive qualities in the thing in question, tend to increase its attracting force. Further, any effort which may have been put forth in connection with such an object increases its hold upon us, and, by strengthening our interest, makes its presence a matter of need.

In this increased attractiveness of an object, however, we discriminate clearly between persons and things. Familiarity with things always leads to *attachment* to them simply by association and interest. If the thing is useful we become further attached to it; if it turn out useless we simply

neglect it; but it still has its place in its interesting environment. But things never arouse in us the opposite, repellant emotion, except by some kind of association with persons.

In the case of persons, on the other hand, the simple attachment which now becomes, in its earliest form, *admiration*, passes over on further acquaintance with the object into a more positive and vigorous emotion. Strengthen the ties of association and self-relation (kinship, partnership, etc.) sufficiently and the emotion of attachment becomes *affection* and *love*. There is a line in the growth of the emotion of attraction beyond which all revelations of character or action, however damaging, only deepen and strengthen the earlier tie. But if this line has not already been reached when damaging discoveries are made—if the attractive emotion has only reached the stage of admiration arising from intellectual interest and casual association—then there comes a revulsion to emotion of repulsion.

Around these three stages in the growth of emotions of attraction the varieties of such feelings may be grouped. *Admiration*, the feeling of deep interest in persons, is *veneration* when its object is elderly, superior, or of high rank; *awe* when it is obscurely grand and imposing. *Attachment*, the feeling of close association with and dependence upon persons and things, has distinct colorings, when felt toward inanimate objects, animals, inferior or superior persons, etc. *Affection*, the feeling of profound attraction toward persons, arising from the deeper ties of family or common life-interests, parallel opinions and aims, or congenial dispositions, takes on innumerable forms known by name as distinct emotions: feelings of *confidence*, *patience*, *security*, *help*, *congratulation*, *self-surrender*, *self-denial*, *tenderness*—in short, all the infinite emotional phases, of past, present, and future reference, which poets have sung and women have felt since one human heart first learned to enlarge its borders to include another.

All such feelings of attractiveness take on peculiar quali-

tion when their objects are matters of future or of past time. The belief-coefficient may be a representative in distinction from the sensational (presentative) one, carrying the force of the future on the one hand and of memory on the other: these emotions are then called *hope* and *joy* respectively.

Emotions of Repulsion. The repelling impulses also supply us with a group of emotions of enormous range and importance. What has been said about the development of the feeling of attraction applies with some modification to this class also. Simple interest and some knowledge are necessary to induce the feeling of *unattractiveness* in the first instance; it grows to be *objectionableness* in things (mainly) or persons. The feelings toward things do not pass into stronger emotion except through association with persons. But with persons it passes into *distaste*, a positive feeling which becomes intense in *abhorrence*. At any stage, except that of extreme repulsion, an attracting motive—kinship, pride, intellectual admiration, etc.—may assert itself so strongly as to cause a revulsion of feeling over to the attractive side: and attachments thus formed are often most lasting and intense.

Many modifications of the so-called feeling of *objectionableness* might be mentioned: feelings of *inferiority*, of *poor breeding*, of *bad faith*, *disdain*, *distrust*, etc. So positive *distaste* may take form as *impatience*, *scorn*, *rebellion*, *impertinence*, *malice*, *vengeance*, *present fear*, *anger*, *hatred*, etc. And *abhorrence* has varieties in *detestation*, *contempt*, *disgust*, *loathing*, etc.

All the emotions of this class also get generalized under coefficients of future and memory reality respectively, and become the opposites of hope and joy, *i. e.*, *fear* (or, more properly, *dread*) and *sorrow*.

§ 7. Sympathetic Emotions.

The second division of presentative emotions has been called *sympathetic*. The word "sympathy," in ordinary

usage, signifies the emotion which is called out by the intelligence of such good or bad fortune to others as sustains no immediate connection with our own.

An adequate psychological analysis of the conditions of sympathy seems to yield the following results:

1. *It is aroused by states clearly pleasurable or painful.* There is no occasion for sympathy with one who does not need it;[1] that is, with one who is not in a state of positive feeling, good or bad. Further, the study of the first sympathies of children shows that they extend to things as well as to persons, and only gradually get narrowed down to objects which feel. Sympathy as an emotion is shown before the child makes any distinction between things that feel and those that do not.[2] But whatever the object be, the emotion is called forth only by such happenings as have before excited the child's own feelings of pleasure or pain.

2. *Some degree of interest is necessary to sympathy.* The confirmation of this appears broadly in everyday experience. I read in the morning paper that thousands of people perish in a Chinese flood, and the cup of coffee that follows it up is much more important to me than their bereaved families. But a single death in my own community makes me at once solicitous in reference to the deceased man's relatives. Yet mere exploring interest, when it comes upon suffering, always starts the sympathetic feeling.

3. *My sympathy is in a rough way proportionate to the nearness of the individual's connection with myself.* This, again, needs no detailed proof: if my brother breaks his leg I feel more sympathy than if a casual comrade meets

[1] Only the painful causes of sympathy will be considered in detail; this accords with the popular usage. The same considerations apply, however, to the pleasurable exercise of sympathy.

[2] Darwin observed sympathy in his child six months and eleven days old.—*Mind*, ii. p. 289.

the same misfortune: and the difference is greater still if the latter be a favorite horse.

4. *Sympathy is aroused, not merely by real beings, but by any idea of suffering.* It is not necessary that we believe in the object of our sympathies. Pictures in memory win our sympathy, imaginations in fiction arouse it, vague forebodings of misfortune to others excite it. Whenever there arises in consciousness an idea of a conscious creature —be he fact, memory, fancy, illusion, reality in any of its kinds, that is, be he a possibility in any form—his fortune as suffering or enjoying moves our sympathy.

This is true in spite of our efforts—often successful as they are—to suppress sympathetic emotion by dwelling upon the unreality or ill desert of the subject of it. "Little Dorrit" will move some readers in spite of their sense that the character is fictitious. We all feel the stirrings of fellow-feeling for the condemned criminal, even though we be convinced of the justice of his sentence. In cases in which we do suppress the emotion it is by getting rid of the idea, turning the attention to something else, exciting some new interest, that we do it; not by depriving the subject in question, the idea of suffering, of its force to affect us.

Definition of Sympathy. It is plain, if these points be true, that sympathy is an *emotion aroused by any presentation which suggests suffering*.

In this definition several further considerations are involved. By the use of the word "suggestion" an important distinction is intended between the object on which sympathy terminates and that by which it is caused. A suggestion is a stimulating idea which is brought into consciousness from without, or comes by an association, in such a way that it does not belong in the course of my real life. A suggested pain, for example, is a pain which I am led to think of, but which I am not really suffering. Suggested suffering has not the present coefficient of pain, but

only a remembered coefficient of pain. Suggested suffering, therefore, is the idea of pain as far as it differs in consciousness from the actual pain of the experience presented.

But the question arises: Does such a suggestion excite sympathy? Suppose a cruel father who punishes his child by pinching; the presentation of the father may suggest pain to the child; but this does not seem to be sympathy —it may be fear, or memory of pain. Yet, on looking closer and observing children, we find that if the father take the attitude which the pain before accompanied, real sympathy is excited. Let him pinch a piece of wood, paper, even his own finger, and the child a year old gives clear expression to its sympathetic emotion. The child does not need the notion of another person who suffers, nor even of another object that suffers; he only needs two things: first, a presentation which suggests vivid pain, and second, the absence of the coefficient of reality which his own suffering had. In other words, the emotion of sympathy does not *require* an object at all. It *acquires* an object, and then maintains itself by the emphasis of this object; but in the first place it attaches to any convenient presentation in close connection with its exciting cause.

Kinds of Sympathetic Suggestion. We may sympathize, therefore, without sympathising with anything, and at first this is the experience of the young child. But its sympathy gets an object, and, by getting it, develops and maintains itself. The fact that the suggesting presentation is generally *the same as the suffering creature* tends to give stability to the object of the emotion. Then there arises the apprehension of the *physical signs* of suffering, for which the child inherits in some few instances a direct susceptibility; and these carry the objective reference of the sympathies over to themselves. Indeed, it is probable that the first suggestions of suffering come from the facial and vocal expressions of others. *Imitation* also leads to

the copying of the movements of emotional expression of others, and this reacts to suggest the appropriate emotions in the child himself.

Development of Sympathy. The rise of sympathetic emotion may be described in view of the foregoing. Considering only the feeling elements, in the light of what has been said of the intellectual conditions of each, we may distinguish three stages in this development, *i. e.*, *affect*, *interest*, *concern*. The *affect* we understand to be a simple present state of feeling considered as having motive force: say a present pain. Affects become strongly associated with presentations, and this association is a process occurring in the attention; the exercise of the attention, then, excites *interest*. Interest, further, as far as it arises in connection with pleasures and pains remembered, introduces *concern*, *i. e.*, sympathy become definite as terminating on a distinct personal object.

Altruistic Element in Sympathy. The much discussed question of egoism *vs.* altruism in the sympathetic emotion may receive partial consideration here. If it be true that suggested suffering excites sympathy, and that it is only suggested suffering that excites it, namely, suffering not felt to be present as real suffering is, and for that reason attributed, when knowledge is sufficiently advanced, to someone else—then we must believe that sympathy is not entirely egoistic. Suggested suffering is at first neither egoistic nor altruistic, because neither the *ego* nor the *alter* exists in consciousness when sympathy at first arises. The reference of real pain to self, and of suggested pain to another, seem to be both late acquirements. But as it is true that the child gets his external objects clearly presented—especially his external personal objects—before he clearly presents himself, so sympathy must be a conscious emotional motive before self-seeking is.

Varieties of Sympathetic Emotion. A large number of varieties or shades of emotion may be classed as sympa-

thetic, *i. e.*, *kindness*, *benevolence*, *charitableness*, etc. When felt toward an equal in character or station we call it *congratulation*, *fellow-feeling*, *fellow-suffering*, *companionship*, *common weal or ill desert*, *solicitude*, *heartache*; toward an inferior, *compassion*, *pity*, *mercy*; toward one much superior it approaches *awe*, but differs from it in an unnamable way.

Social Feeling. The further generalization of the idea of personality to which developed sympathy attaches gives the emotion a broader reference. Social feeling is sympathetic emotion as it attaches to man in general. It can only arise after the conception of man is reached, of man as a multiplication of particular men *like myself*. As long as men were not considered all "like myself," but some slaves, some barbarians, some Gentiles—only a few Greeks or Hebrews—social feeling had only the range of the class or race in the midst of which it arose. Particular forms are feelings of *equality*, *justice* and *injustice*, *rights*, *political and patriotic* feelings, etc. Also under this head should be included feelings of *rivalry*, *emulation*, *jealousy*, *ambition*, *competition*, *love of fame or reputation*, *sensitiveness*—all the emotions, in fact, which arise from the association of man with man in social life. Intense pleasure and pain both tend, it may also be remarked, to sociability and communicativeness.

§ 8. Representative Emotions.

Presentative pass over into representative emotions when the object is itself representative, *i. e.*, a memory, imagination, reproduction of any kind. It is sufficient to say here that the emotion aroused by a reproduction is the same as that of the original presentation in kind. They are prevailingly, however, of much lower intensity. The time element which they involve also gives them a new coloring; the joys of memory are, in a vague way, different from the joys of the present or of the future.

CHAPTER XXI.

EMOTIONS OF RELATION.[1]

THE higher reaches of apperception in conception, judgment, and thought give rise also to characteristic emotional states. The fundamental act of attention as relating function gives most general coloring to this class of feelings, and from it they also derive their name, *relational* feelings.

At the outset three very distinct kinds of emotional experience may be distinguished: intellectual or *logical* feelings, moral or feelings of *right and wrong*, and æsthetic or feelings of the beautiful. The latter two may be further classed as *conceptual* feelings.

§ 1. LOGICAL EMOTIONS.

By distinguishing the more fundamental emotions of relation as logical, we intend to point out those to which the coefficient of thought-belief attaches: those which attend upon the various acts of judgment. First, we find a class of feelings arising from *bare relationship* as itself the object of consciousness, *i. e.*, feelings of *reasonableness* and *unreasonableness*, of *contradiction*, of *logical satisfaction*, of *tendencies of thought*, of *ignorance*, of the *unknown*, the *mysterious*, the *inscrutable*, feelings of the *inconclusiveness of argument*, of the *hypothetical*, of the *inconclusive*, etc. These feelings are in close affinity with the great class-feelings already described as doubt and belief.

Connected with time relations we have what may be called *time-emotions*, *i. e.*, *anticipation*, *prophecy*, *presentiment*, *hope*, attaching to the conception of future times;

[1] Cf. *Handbook of Psychology*, vol. ii, chap. ix.

retrospection, reverie, musing, regret, feeling of the irremediable, of *opportunity* lost or improved, attaching to the conception of the past; and *routine, surprise, amazement, astonishment, present opportunity, hasty decision*, attaching to the idea of the immediate present.

Space relations also are reflected in emotional states: feelings of *distance*, moral *remoteness* or *nearness*, *grandeur, pettiness, mental vacancy*, besides the ordinary sensuous feelings of spatial relations.

Other relationships give us feelings of *consistence* or the contrary, *i. e., communion, community, company, loneliness*; of *quantity, i. e., importance, insignificance, greatness, abundance, economy, paucity, poverty, completeness* and *incompleteness*; of *identity, i. e., sameness, resemblance, difference, contrast, quality*; of *fitness, i. e., utility, uselessness, adequacy, insufficiency, redundancy, congruity* and *incongruity, suitableness, adaptation, means and end*; of *objective power, i. e., agency, destructiveness, might, fearfulness*.

The peculiarity of this whole class consists in the conscious explicitness of the act of relating. Judgment has been distinguished from conception and imagination by this very feature. Yet as there is every degree of progress from the more mechanical union of factors in the pictures of passive imagination to the clear consciousness of relation as found in judgment, so these feelings vary from a most to a least degree of explicitness in this respect. As might be anticipated, further, there is a class of emotions attaching peculiarly to the least evident degree of relationship, as it appears in the apperceptive process before it reaches conscious assertion in judgment. These we may now consider.

§ 3. Conceptual Emotions.

The progress of the intellect from the involuntary combinations of fancy to the free constructions of imagination

and conception has already been depicted. This progress is a matter of feeling also—the feeling of enlargement of range, emancipation, constructive capacity, which is covered in popular language by the phrase *getting or having ideals.* If my imagination builds up for me something more pure and satisfying in any particular—form, color, use—I say that result approaches more nearly to my ideal in that direction. If, again, I set myself to draw up a system of philosophy, I express my satisfaction at each turn of its development by saying it tends toward my ideal of a system; and I reverence a character more because, as I think, it more nearly embodies my ideal of a man. So in all construction whatever, besides the feeling of the extent of actual construction, there is a feeling of further possible construction—construction beyond what I have done, yet in the line of what I have done.

§ 3. Construction of Ideals.

The process of constructive imagination has been described.[1] It is the machinery by which ideals are produced. It is only necessary here to give the elements before pointed out their proper place in the scheme of feelings.

The *appetence* or moving force which impels a scientist or artist to produce is the impulsive principle of need now found to underlie belief and action in general. It belongs among the higher impulses yet to be discussed. The artist's *intention* expresses the permanence of this impulse and its exhaustive range over the material available to him. He *selects* his material under the law of voluntary interest. What constitutes the *fitness* of his material is the problem of what ideals are, and it is that aspect of the case to which we must now turn.

Nature of Ideals. What are ideals? What is art from the spectator's point of view? Evidently ideals are something felt in connection with present images; something

[1] Above, chap. xiii. § 4.

that is, in virtue of which peculiar feelings arise over and above the simple feelings of apprehension. In other words, conceptions of the kind produced under the lead of the constructive imagination have a peculiar quality, which leads us to pronounce them true, beautiful, or good. From the essential nature of conception we are able to reach, in a general way, the lines within which this quality must be sought.

1. Conception proceeds by abstraction, and abstraction has been seen to be the mental tendency to pursue identities through the mazes of new experience. The gratification of this pursuit of identities arises as a feeling of pleasure whenever two elements of experience before disparate fall together in a unity or common meaning. Without such a process of identifying, with its accompanying gratification, no conception whatever can take place. One element of conceptual feeling, therefore, must arise from abstraction, and this element may be best characterized as the *feeling of unity in a whole.*

2. But an equally important, because opposite, aspect of conception is generalization: the function whereby a concept gets application over a wider area of experience by a modification of its content. In abstraction I preserve my concept and neglect all experience which does not illustrate it; in generalization I accept my experience and modify my concept to include it. It is a mental tendency away from identity to variety, and its gratification brings another element to conceptual feeling, *i. e.*, the feeling of *harmony of parts.*

3. The intension or depth of a concept begets a phase of feeling in response to the peculiar value of it in experience, while its extension excites only a feeling of its present accidental application. Man in intension excites in me the sympathetic and social feelings; it indicates humanity with the living thrill of interest the word suggests; but man in extension simply means men, anybody, everybody, common

place and uninteresting. The emotion of intension let us call the feeling for *meaning*, a third essential ingredient in conceptual emotion.

By *meaning* we mean interesting quality, recognizing in the word all the springs of interest, intellectual, emotional, and volitional, already discussed. Our ideals are the things of most absorbing interest to us.

4. Further conceptions are objective in their reference; they arise in the knowing function. Their objectivity means both that there are objective relations presented, but that these relations hold for others no less than for myself. Both these aspects may be covered by the phrase *feeling of universality*: a fourth ingredient in conceptual feeling.

Ideals, therefore, are *the forms which we feel our conceptions would take if we were able to realize in them a satisfying degree of unity, harmony, significance, and universality.* The first two properties we may call ideal *form*, the third, ideal *meaning*, and the fourth, ideal *validity*.

Feeling of Fitness. We are now able to give more exact definition to the state of consciousness before designated as feeling of fitness. It attaches to certain images of imagination which are available for conceptual construction: namely, to those which tend to take form in ideals. It indicates promise of progressive idealization under some or all of the rubrics pointed out above. But it precedes actual construction, since ideals are not positive constructions. If conception follows, then the feeling of fitness either becomes simple feeling of logical relation or it attaches in turn to the new product as far as it is felt to be fit for further ideal construction. For example, I feel that each fact discovered in nature or the laboratory must fit in a construction of all similar facts called a law; but when this law, now a vague felt ideal, is itself discovered, then my feeling of fitness attaches to it only as it in turn

serves as an element of a still broader ideal of systematic science.

§ 4. Range and Kinds of Conceptual Feeling.

The various ideals to which we find ourselves committed with greater or less emotion may be classed under three heads, according to the classes of data which are felt to be fit. First, we appreciate logical fitness by what we may call feelings of the *systematization of truth*. Again, we have ideals of character, feelings for the good, or *ethical feelings*. And third, we grope after ideals of beauty: we have *æsthetic feelings*. These may be considered in turn.

§ 5. Feeling for System in Mental Construction.

Scientific and Philosophical System. The exercise of the scientific imagination is accompanied by the scientific ideal, and its materials are selected as fit to realise this ideal. Of all conceptual ideals the scientific is most plain. Here the criteria of unity and variety have almost exclusive voice, and apply throughout all the kinds of relation which arise in the process of judging. The ideal is complete unity of conception in the infinite variety of objective fact, and each new generalization in any science, as chemistry, biology, psychology, is in so far gratifying as a partial realisation of it. And the pursuit of philosophy attains its gratification in the same endeavor after unity of conception.

§ 6. Ethical Feeling.

Its Coefficient. Assuming that the moral feelings accompany the process of conception, we may ask after their peculiarities. What is their general nature, and to what kind of experiences do they attach? Using the words *good* and *bad* to express what we mean by moral approval and disapproval, we may examine consciousness to find their application. The moral coefficient is that in

experience which leads us to attach to it the predicates good and bad; it may be called, for the present, *moral quality*.

Moral Quality. A rough generalization easily leads to the conclusion that good and bad, in their moral significance, attach only to possible *actions*. If I say a man has a bad character I mean that he is capable of bad conduct. If I say a knife is good I mean simply that it is useful; not that it is moral at all. But not all actions are moral. Some actions are forced. I may be driven to perform an act against my will. This is not moral. So we reach a further point, *i. e.*, moral actions must be *voluntary* acts, or acts of will, whatever will may turn out to be. Further, not all voluntary actions are moral. I may dine at two o'clock or at six; I may take my walk north or south: these actions are morally indifferent. What further peculiarity attaches to some acts of will, whereby we call them good or bad?

A reference to the general psychology of conceptual feeling, as already developed, will throw light upon this point. We found the feeling for ideals to involve in its object harmony, meaning, and universality; so, if the moral feelings are rightly classed as conceptual, only those states of will which fulfill these conditions in some degree will be found to excite moral approval or disapproval.

Moral Quality as Harmony. Acts of will which are moral can never be taken out of their environment in consciousness and conduct, and pronounced good or bad. Moral actions are those which are harmonious with each other in reference to an ideal. A morally indifferent act is an act which stands alone, which is of no value to anybody except the doer, and of no value in the complex acts which make up the doer's conduct. The reason that my dinner hour is indifferent is that it has no value to anyone but myself, and none to myself except my convenience. As soon as it does become a matter of health to me, or

comfort to anyone else, *i. e.*, gets a setting of relations more or less conscious, it does become moral. Moral quality, therefore, attaches to an act of will considered as an element in a complex of interests, my own and those of others. Moral predicates attach to certain felt possibilities of conduct considered in relation to all other possibilities of conduct.

Moral Quality as Universal. The universality of ethical feeling arises in consciousness in two new and distinct forms. Not only is morality objective in the sense that others are held by me to the judgments that I myself make: the universality of truth in general, but the existence and claims of others enter as factors in the content of the feeling for myself. The feeling of *sympathy* is one of the elements whose satisfaction this moral satisfaction as a whole must include. And further, simple disinterestedness, as all conceptual feeling involves it—value apart from gain or loss to myself—does not here suffice; but the feeling of restraint, constraint, *obligation* takes its place. These two factors may be considered further.

Moral Sympathy. Moral sympathy attaches exclusively to the idea of persons, and carries with it the notion of self. The idea of suffering which was found sufficient for sympathy as an expressive emotion now gains its full personal reference. This feeling may be described as the consciousness of the equality of individuals in reference to ideal good.

Moral Authority: Feeling of Obligation.[1] The second aspect of moral universality is the *feeling of obligation*, or of subjection to moral authority. As already said, it is a consciousness of both restraint and constraint. It is further felt to be from within, *i. e.*, not to have any assignable cause outside of consciousness. It restrains from one course of conduct and constrains to another. It does not enter simply as a possible alternative which I may or may not

[1] Cf. what is said on the feeling of responsibility below, chap. xxvii. § 4.

embrace, which may be neglected or not as I please; but it has an additional element of feeling, the feeling covered by the word *ought*. I *may* go to a lecture or not; I *ought* to help my poor neighbor. This is ordinarily called the *imperative* aspect of ethical feeling.

Moral authority is the feeling that a peculiar worth attaches to certain motives or ends in relation to other motives or ends. This worth is further not merely a recognized worth in view of an ideal, but a worth felt to be imperative upon my free choice. In other words, the sense of moral authority may be defined, at the present stage of our inquiry, as a *feeling of an imperative to the will to the free choice of a moral end.*

Upon this determination certain remarks may be ventured. First, the imperative of the feeling of obligation is an unconditional imperative. While it is true that it arises only in connection with alternative courses of action, yet when once arisen it is, as an ought-feeling, quite independent of such connections and conditions. This Kant has emphasized by the phrase "categorical imperative." Second, the feeling of freedom is still present before alternatives, even when the moral imperative is clearly attached to one of them. Though I feel that I ought to pursue a certain course, still I feel *free* to disregard my own moral injunction and pursue a different course. Third, that the ought-feeling is always relative to an ideal is seen in the fact that the same course of conduct is at one time right, at another wrong or indifferent. The morality, therefore, as already said, covers the harmony of all possibilities with reference to an ideal. And fourth, moral feeling always attaches to the concrete, to particular acts of will. We have no general feeling of right or wrong. We may vainly attempt to depict the moral ideal as an abstract ideal, and through it to arrive at the sense of right in the abstract: but moral decisions, as such, are always decisions on actual concrete possibilities of action.

Ground of Moral Authority. The further question, therefore, arises: How can such a principle of the activity of will get its application to concrete courses of conduct? Why are not all acts of will included, *i. e.*, why are they not all moral? The following answer may be suggested without further remark, *i. e.*, the determination as to what conduct in the concrete is morally imperative takes place by a reaction of consciousness upon a group of alternatives in such a way that these alternatives are arranged in a scale of values with reference to the moral ideal and to one another, the highest value being approved as relatively right, and the others disapproved as relatively wrong.

In this position, it is seen, the determination of an act as right or wrong is a relative determination—a determination of the adjustment of particular alternatives to each other as regards worth for an ideal. In other words, the particulars are the material of different degrees of fitness for a generalization. That generalization—could we make it—would be the moral ideal, and the peculiar feeling of approval or disapproval of the most fit in possible conduct carries with it also the feeling of oughtness. The conclusion on moral authority is, therefore, that it is psychologically "ultimate and unanalyzable."

Conclusion on Moral Coefficient. In regard to the subjective side of moral quality—the conscious feeling of the presence of the right or wrong—we are now able to speak more definitely; and we may conclude, in conformity with what has already been said, that the moral coefficient is the *feeling* of an attitude of the will toward or from one of alternative courses of conduct as relatively fit or unfit for construction in a moral ideal. And this fitness is, as far as can be discovered: first, the degree in which a course of conduct is felt to *harmonize* with most interests, to be *approved by others* as well as by myself, and to be *imperative*, though not executive, upon my choice.

The moral coefficient is thus seen to have two sides, a

subjective and an *objective side*. Subjectively it is an approving attitude of will with felt obligation, all that is meant by the word *ought;* objectively it is harmony and universality, what is meant by the word *right*. About the ought the above is all that we have to say; it is an ultimate category of feeling, whatever its origin may have been. As to the right, certain rules of conduct are usually formulated, which find their highest expression in the Christian principle of Love.

Moral Ideal; the Ethical End. Of the elements found necessary to ideals generally, that is, necessary to conceptual feeling, meaning was included no less than harmony and universality. Having now looked at the elements of harmony and universality involved in ethical feeling, it remains to consider the element of meaning. To draw again a distinction already made, not the spectator's point of view alone must be considered, but the composer's, the constructing agent's; in this case, the doer's point of view. If I would do right what kind of a pattern or end do I set myself?

Notion of End. An end is that which I consciously present to myself for possible pursuit. It must be clearly distinguished from motives, which are any influences whatever that may come to bear on the will, whether they be consciously presented or not. Only some motives are ends. Further, an end does not always carry the presentation of self; a child has an end when it imitates the movements of its nurse, before it gives evidence of reflection upon its own mental states. Consequently there may be more than one end in consciousness at once; which means that the end is distinct from volition. Volition is the choice of a particular end.

Subjective vs. Objective Ends. In saying that an end must be consciously presented it is further meant to exclude organic and biological results which seem to us to be due to presentation or purpose. The physical organism

is full of adaptations all supposed to minister to the greatest pleasure and to produce the least pain. Yet pleasure and pain are not necessarily the ends of our voluntary physical activities. In order to become *subjective* ends they must be pictured as the objects of the voluntary process; otherwise, being *organic*, they are a *form of objective* end.

Doctrine of Ethical Ideal or End. If what has been said about moral quality and authority be true the doctrine of the end is plain. The rightness of an act is only arrived at in the concrete, *i. e.*, in relation to other acts. What I ought to do, therefore,—the *content* of my choice,—is relative. The form, *i. e.*, that I ought to do right, is always the same no matter what the act be. It is a "universal imperative." The form cannot be the end; that would be tautology, *i. e.*, I ought to do what I ought. But an adequate statement of the content as universal end demands a perfect generalization of all possible concrete choices, which is impossible. Hence *there is no universal subjective end*. My ethical consciousness tells me universally *that* I ought to do right, but it does not tell me universally *what* I ought to do, to do right. In every dilemma I may be in it is a question as to *what*, *which* I ought to choose; not whether I ought after I have chosen.

It follows from a sufficient understanding of the nature of conceptual feeling that all statements of the ethical ideal must be inadequate. Fitness for an end cannot mean adequate embodiment of that end; no one's alternatives of conduct can cover the whole of the possible fields of adjustment of wills to one another in a developing social organism. The ethical ideal, therefore, as far as it is conscious, is *the degree of harmony and universality in conduct which I find my emotional nature responding to with imperative urgency*. As an ideal it is relative and changing in the life of the individual and of the race; yet that embodiment of it to which the individual or the race at any

time responds is of absolute and unequivocal validity then and there.

The highest embodiment of the ethical ideal is the conception of the character of God. This does not give a statement of the ethical ideal, however, for the conception of God as a perfect being is of a character which realizes our moral predicates to perfection, and as such shifts with our development and that of the race. Instead of the end consisting in our conception of God's character, the reverse is true. God's character to us results from our conception of the moral end.

Rules of Conduct. There are, therefore, valid rules of conduct which are imperative upon the individual, not because they are universal statements of the ideal, but because they generalize our concrete intuitions of the right. They are the objective side of the moral coefficient. The worth of each of them, however, in any case, depends upon its support from the moral consciousness in that particular case. Such principles are veracity, temperance, prudence, mercy, forgiveness, etc. These rules are absolutely binding wherever the moral consciousness gives them an application; but they are not applied by the moral consciousness universally. For instance, veracity is sometimes subordinated to a higher demand of ethical feeling, such as loyalty, humanity, or charity.

Conscience. In the word conscience the ethical consciousness has its broadest characterization. Conscience may mean and does mean three very distinct things—three things, however, so essentially one as a mental fact that the use of a single word to cover them has its full justification. If we cut the mental life right through at the moment of positive ethical feeling, getting a section of the mental stream, so to speak, showing all there is at that moment, this section is conscience. The three portions of the section correspond to the three determinations we have already made, *i. e.*, *moral quality*, *moral authority*, and *moral ideal*

Let us take a concrete case of action from conscience: I give money to a beggar because I am bound by conscience to do so. The moral quality of my act is my feeling of its harmony with my better acts as a whole, and the exaction I make upon other men to be charitable also; without this conscience would be wanting—the act would be indifferent. The moral authority of the act is the feeling which at once arises that this quality has an immediate reference to my will. I am bound to choose it as my act; without this there is no conscience—conscience is dead. The moral ideal is the outreach of my feeling toward a state of will in which such a relative and hesitating decision would yield to clearer and more direct moral state of will which I cannot picture, cann , but which I feel my will is meant for, and fo y present act for conscience' sake as the only mean to prepare me.

Consequently, from the point of view of the individual ; *spontaneous authoritative reaction of approval or disapproval of one of alternative ends, as of higher relative excellence with reference to an ideal unseen but imperatively enjoined.*

Emotions Akin to the Moral. Around the fundamental moral emotions cluster a number of more special and complex feelings. Moral *approval* and *disapproval* of others in different degrees becomes moral *praise* and *blame*, moral *respect* and *contempt*, moral *reverence* and *disgust*: applied to self they are feelings of *good conscience* and *remorse*, moral *hope* and *despair*. These latter take on peculiar forms when complicated with the knowledge that others know and judge our case, *i. e.*, moral *pride* and *shame*. These two feelings are the most powerful and lasting of our moral nature, as witness the aggravated punishment of the "Brand of Cain" and the "Scarlet Letter." They bring all the motive and emotional force of the sympathetic nature to reinforce the intrinsic sanctions of duty. Other forms of the ethical emotion whose factors

suggest themselves readily are *repentance*, moral *penitence*, moral *restitution*; and moral *cowardice* and *hesitation*, on one hand, contrasted with moral *courage* and *resolution* on the other. The great class of *religious* feelings are also most closely connected with ethical emotion and rest upon it.

§ 7. Æsthetic Feeling.

In beauty, the elements of what we call the ideal seem at the outset to be most fully set forth. The simplest observation of beautiful things suffices to illustrate the necessity of both unity and variety in form. There is no beauty when unity is absolute, and it is only when arrangement is possible to a degree which allows a distinction between variety which is yet unity, which has a plan, and variety which is multiplicity, which has no plan—that any such feeling arises at all. It is equally evident, also, that meaning, significance, contributes to æsthetic effect. The beauty of a landscape is cold and formal until the smoke of a peasant's hut, or the spire of a country church, is added to give it a touch of human interest. The village green has more meaning than snow-clad Alps. And, further, we feel the essential sharableness, universality, validity of all beauty. I expect a face to appeal to you as it appeals to me.

While all beauty, thus, has the ideal character, and is for that reason conceptual, yet it is well to distinguish two kinds of æsthetic emotion: that which attaches to more sensuous experience, and is almost exclusively *formal*, and that which attaches to more representative experiences, as having *meaning*. Following Wundt, the former may be called *lower* and the latter *higher* æsthetic feeling.

I. **Lower Æsthetic Feeling.** It is difficult to determine when the sense of the beautiful begins in child life. The expression of such a sense is for a long time simply the ordinary expression of pleasure—smile, active muscular

movements, etc.; and the presumption is that simple pleasure is all there is to express. Yet, by inquiring into the effects upon the child of objects otherwise indifferent, expressions due to form alone may be isolated.

The objective character of æsthetic impressions leads us to look upon sight and hearing, the most presentative senses, as the exclusive organs of sensuous beauty. The objective form of sounds is time, and those of sight are time and space. The formal element, therefore, in all æsthetic feeling is unity and variety in time and space relations.

Further, in both time and space a distinction may be made, with Hodgson, between static and dynamic relations. Sounds which occur simultaneously, and spatial relations which are perceived to be stationary, are called static; sounds following one another, and space relations which change through physical movement, are dynamic. The ordinary words for these two qualities are *repose* and *movement*.

As regards time relations music is the purest and most adequate illustration. In the chord the static quality is illustrated. The variety of auxiliary tones is held in a unity dominated by the fundamental. The single tone in ordinary instruments is, further, a static effect, since in it there is also a variety of secondary or over-tones which give to it its peculiar timbre. In general, *musical harmony* is the static *form* of the æsthetics of time. The dynamic element in the æsthetic feeling of time relations is presented by rhythm, complex transitions, beat, measure, movement. It presents the formation and resolution of harmonies in a series of effects, which are united in the flow of the composition as a whole or of portions of it. This dynamic aspect of the case is known in music as *melody*.

In regard to relations of space the distinction between static and dynamic, between rest and movement, is equally

plain. Architectural beauty illustrates the former; beauty of wheels in motion, birds in flight, the intricate evolutions of the dance and the drill illustrate the latter. Considering the static quality, the question arises: What relations of space are æsthetically most pleasing? In plane figures richness of division, together with evident simplicity of plan, is the æsthetic desideratum. A square inscribed in a circle is more pleasing than either the square or the circle; but two overlapping equilateral triangles in a circle present still greater attractiveness. Investigations have been made into the most tasteful laws of longitudinal and vertical division. For the best effect longitudinal division should be either perfect symmetry (bisection about a vertical axis) or some proportion well away from symmetry. Zeising's principle, called the "golden section," is that, in horizontal division, the longer part (b) should be a mean proportional between the shorter (c) and the whole (a), viz., the proportion $a : b :: b : c$ should hold. For vertical lines it is held that the point of division should be two-thirds to three-fourths up from the bottom, or the same distance down from the top: as the arms on the erect human body, or the lowest broad-spreading boughs of the arbor vitæ. The quality in division which excites æsthetic feeling we may call *balance*.

As regards plan the question is largely one of *outline*. If the divisions are pleasing, in what kind of an outline shall the lines of a design terminate? The attempt has been made, and probably with some success, to connect the pleasure of outlines with the relative ease or difficulty of the eye movements required to compass the figure in question. The normal movement of the eye, except in its vertical and horizontal axis, is a curve of gentle and somewhat irregular curvature. Hence the general principle that curved lines present a more pleasing outline to the eye than extended straight lines. And variations of the same principle are, that curved outlines are more agreeable when

the law of curvature changes slightly at frequent intervals; that transitions should be by curves rather than by short turns or angles; and that sudden irregularities are allowable only when they can be brought under a regular law of recurrence, *i. e.*, reduced to the general plan of the design as a whole. Put more generally, the scheme of æsthetic form for the eye conforms approximately to the field of vision. The ideal of form is indicated by the most facile and pleasurable adaptation of the eye at once to detail, and, by easy transition, to the plan as a whole. The erect human form has been considered from antiquity the supreme illustration of beauty of form, both as regards balance and outline.

The graphic arts and sculpture, called, as opposed to music and architecture, the imitative arts, embody ideals of space form. They are imitative only in the sense that they represent objects taken from nature; but imitation is altogether subordinate, as is seen in the fact that only such objects in nature are suited to the purposes of art which are already recognized as embodying some ideal. A painter paints a face either for its beautiful form or its beautiful meaning, or both: if it has neither, it is not beautiful as a picture of a face, and hence is not æsthetic, not art. Even a portrait must idealize somewhat to be beautiful and satisfying.

Perspective in the graphic arts is the reduction of space relations of depth to the form of the original field of vision in two dimensions, *i. e.*, to a flat surface. If it is true it conforms to the requirements of all spatial beauty; it has a visual center to which its lines of direction converge, and if there be two or more of these centers they must be in turn subordinate to yet another.

II. **Higher Æsthetic Feeling.** We now come to consider beauty apart from its framework of sense-perception. If space and time relations were all that æsthetic ideals included, beauty would be robbed of most of its power to

influence and gladden us. It is the meaning, the suggestiveness of art that rouses in us feelings for ideals. This meaning is by many writers simply made convertible with the associations or memories which the beautiful object calls up. For example, a building becomes beautiful when we know that it is a hospital for sick children. The knotted hands of a workman suggest a lifetime of privation, toil, and devotion, and rouse in us emotions of respect and admiration. Yet even in cases where simple association is most conspicuous the suggestions themselves involve ideals and seem to bring them more vividly before us. The suggested emotion does not terminate on the building, but on the ideal of charity which it represents; not on the physical hands, but on the ideal of life which they suggest. Association is, therefore, not the whole of what we intend by the word meaning. It is only as associations themselves have meaning that they enter into the meaning of present beauty.

In an earlier place meaning was connected with the intension of concepts. Intension includes all the data that we have about objects. But we have more data about objects than their simple presentative associates; we have also the feelings, of whatever kind, which they excite, and the motor reactions to which they impel. All these elements must enter into the framework of æsthetic emotion in its higher forms, *i. e.*, associative connections, emotional revivals, volitional and ethical reverberations. And all this framework must be *conceived* as representative of unity in variety, harmony, universality, in a particular sphere. That is, higher æsthetic feeling arises only by the tendency of the abstracting and generalising function to transcend its immediate presented material. The complete æsthetic coefficient, like the ethical end, is an ideal and cannot for that very reason be given adequate formulation.

Emotions Allied to the Æsthetic. The violation of certain elements in the requirements of beauty, while the

other elements are present, gives rise to distinct emotions. In the *comic* we have violations of the law of consistency. The comic is the æsthetically abortive. A joke turns on a misplaced grammatical or logical relation, which, if properly placed, would have been æsthetic. A comic situation is an incongruity, where the conceptual process demands congruity and anticipates it. Hence the elements of surprise, disproportion, and disharmony, in all humor and wit. The comic is a matter largely of meaning. The *grotesque*, on the other hand, is the comic of form. The *picturesque* illustrates a similar departure from normal beauty, but not sufficiently so to lead to positive inconsistency. It applies especially to form, and is found in the bold, sharp, irregular, unexpected in outline. In the *sublime* the meaning attaches to particular feelings, those aroused by the large, massive, forceful, and destructive; it seems also to include a coloring of fear and awe.

§ 6. General Table of Feelings.

We have found the following divisions of feeling:

Qualitative Feelings

- Sensuous
  - Common
    - Organic, etc.
  - Special
    - Sensations
- Ideal
  - Common
    - Interest
    - Reality etc.
    - Belief,
  - Special

Emotions

- Of Activity
  - Of Adjustment
  - Of Function
- Of Content
  - Presentative
    - Self
      - Expressive
      - Sympathetic
    - Objective
  - Relational
    - Logical
    - Conceptual
      - Systematic
      - Ethical (Religious)
      - Æsthetic

CHAPTER XXII.

QUANTITY AND DURATION OF EMOTION.[1]

§ 1. Quantity or Intensity.

Mental Excitement. The most general predicate which we can make of the states of feeling arising about mental operations is expressed by the term *excitement*. The word means stimulation, and as physical stimuli bring about a more or less diffused physical reaction or bodily excitement, so presentations, ideas, stimulate higher states of feeling in forms all of which exhibit the diffused property called excitement. If we picture a logical machine, with no feeling whatever, turning out syllogisms, we picture at the same time the absence of that excitement which makes the mind in its logical character different from such a machine. "Coolness" is the popular word—"calmness" is more fitting—to denote the absence of emotional excitement. For the present we will consider such excitement on its conscious side, and call it mental, leaving the question of its relation to nervous diffusion until its inner aspects have been pointed out.

Relativity of Feeling. The general nature of feeling, as dependent upon physical and mental processes, accounts for its extreme variability in different and in the same circumstances. If feeling arises everywhere in consciousness the present state of feeling must result from a great complexity of bodily and mental conditions. The principle of contrast has already been applied to the phenomena of sensation,[2] and its application to emotional states is evident.

[1] Cf. *Handbook of Psychology*, vol. ii, chap. x.

[2] Above, p. 65.

Emotional Expression. As the facts of hypnotism show, the emotions belong in the reactive consciousness. As forms of excitement they represent conditions of intense stimulation, and find their physical basis in processes of pronounced nervous change. As excitement simply, apart from qualitative differences, emotion indicates a diffusive outgoing wave of nervous action consequent upon heightened processes in the centers of the brain. Viewed qualitatively the particular emotions are correlated to nervous discharges in particular directions and portions of the nervous apparatus, issuing in muscular contractions to a large degree differentiated and peculiar. Such muscular indications of emotion are most clearly marked in the face, though the more intense extend to the limbs, and finally take the form of massive and convulsive movements of the trunk. So familiar are we with these forms of emotional expression, and so expert have we become in reading them, both from experience and by heredity, that our responses to them are instinctive. Only the practised observer is able to analyze the common facial indications which we all readily construe in terms of answering emotion.

A good deal of progress has been made by psychologists in assigning to the different emotions their peculiar correlatives in the muscular system. In general, each main emotion expresses itself, not by the contraction of a single muscle, but of a co-ordinated group of muscles. The smile or weeping of an infant is, at the start, a matter of very extended muscular innervation, and in adult life the entire countenance seems to take on the semblance of thought or laughter, and to support the brow or mouth in its assumption of the leading rôle. The general facts of the case as respects the leading presentative emotions, are readily observed by noting others, or by simulating emotion before a mirror; it is unnecessary to go further into details which are endless and wearisome.

The hypnotic state, especially the condition called by

the Paris school catalepsy, affords a striking method of studying expression.[1]

The fundamental emotional expressions are impulsive. The child inherits the necessary vital reactions for its life and growth, and, besides these, certain muscular contractions indicative of pleasure and pain, joy and sorrow, *i. e.*, smiling, weeping, crowing, sobbing, etc. Very early more distinct emotions grow up with corresponding ready formed reactions—fear, wonder, anger, love, jealousy, etc. It is probable, from what we know of mental growth, that the rise of these early emotions waits upon the development of their appropriate nervous basis: which means also that it waits upon the development of certain cortical centers. Such general emotional expressions are either elevating and exciting, or depressing and inhibiting.

Physical Basis of Emotion. Conceiving the problem of expression under its widest reach, the view required both by the physiology of the nervous system and by the facts of consciousness comes plainly out. Let us call the aspect of nervous processes which belongs peculiarly to emotional excitement the nervous *coefficient* of emotion, substituting this phrase for the question-begging word expression. The question then is: In what kind of a nervous process does this coefficient consist? What nervous process varies—rises and falls, grows or contracts in extent—with corresponding variations in conscious feeling?

Now in the general conception of the nervous system stated above, we found that personal consciousness was present only when the system attained high integration. We have also found that sensibility is only another name for consciousness: intense consciousness is intense sensibility or excitement. Excitement, therefore, is the kind of consciousness which arises when nervous integration is intense, *i. e.*, very complex and very unstable. This is the nervous coefficient of emotion. Emotional expression is, then, the

[1] Compare Binet and Féré, *Animal Magnetism*, p. 277.

outgoing side of the nervous coefficient. Complexity at the centers means diffusion in discharge; instability at the centers means facility of discharge—just the two characteristics of emotional expression.

Conscious Diffusion of Emotion. The element of diffusion already pointed out in the nervous basis of emotion is a marked characteristic, also, of mental excitement. Strong emotions spread themselves out over the whole content of consciousness, and our thought current becomes grave, gay, elevated, depressed accordingly. Not only so, but we objectify our feeling to an extent. The external world takes on the color of our mood. This is probably due to our lack of control over strong emotion: we are unable either to banish it or to pin it down to its peculiar object. It is also especially true of the more deep-seated organic conditions which give tone to consciousness as a whole. Dyspepsia is the most notorious enemy to good spirits.

Emotion and Passion.[1] Do we love our friends when we are not thinking of them? The answer to this question introduces us to the great class of facts covered by the word *passion*. By passion is meant the growth of emotion in depth at the expense of expression. What we have already learned of physical and mental habit would lead us to expect a consolidation of emotions in a few great habitual forms of reaction; for this is what we find both in the nervous organism and in the intellectual life. Nervous reactions become organized in subconscious motor intuitions; mental reactions become organized in perceptions, subconscious beliefs, and interests: so emotions take on mentally subconscious forms. They become so habitual as to be unremarked except when some new occasion calls them out in the shape of emotional excitement. A man's love for his *fiancée* is a matter of constant consciousness and expression; his love for his wife—it takes a burning

[1] The word *passion* corresponds to Kant's *Leidenschaft*. The Germans use *Affekt* to cover emotion as excitement.

house or a drowning accident to bring fully into his consciousness. Emotional excitement, however, remains the method of expression of passion, and in popular speech the term passion is given to such violent expressions themselves. The real passion, however, is deep-seated prevailing emotional motive; it enters profoundly into our notion of character.

Among the most marked passions some are clearly inherited, others may be traced in their development from occasional recurring experiences of emotion. The most distinct classes of passions may be designated *affections* and *sentiments*. Affections arise from the more interested and personal classes of emotions: examples are *sympathy*, *love*, *contempt*, *benevolence*, *stoicism*, *pessimism*. Sentiments spring rather from the more objective, disinterested emotions: examples are *reverence*, *respect*, religious or irreligious *attitudes*, *love of beauty*, *morality*, etc.

Theories of Emotion. Three general views are held as to the nature of emotional excitement: *intellectual* theories hold that all feeling is ideal feeling, taking its rise from the relation of ideas to one another as opposing or reinforcing. This theory fails confessedly to account for sensuous feeling. *Physiological* theories make all feeling sensuous feeling in compounds of varying degrees of complexity. Emotion is a higher form of organic pleasure and pain, a biological function. This theory fails to account for higher emotion, or, indeed, for feeling-qualities generally. It involves a doctrine of unity of composition throughout the entire affective life. *Original* theories are opposed to these in holding, in some form, that feeling-qualities are original subjective facts. The entire foregoing exposition of feeling is an argument for the "original" view.

Reproduction of Emotion. From what has been said of the conditions of the rise of emotion, the laws of its reproduction are evident. If emotion is present only when an

ideal object is present, and if an ideal object is present only when the brain conditions of earlier sensation are reinstated, then the laws of association of ideas with their basis in dynamic cerebral processes are also the laws of the revival of emotional excitement.

In consciousness the dependence of revived emotion upon revived ideas has the same evidence as that of first-hand emotion upon presentations, *i. e.*, the evidence of invariable concomitance. Among these ideas, however, we find remembered muscular and organic sensations. I may reproduce grief either by recalling a grievous event or by throwing my countenance into the form of grief expression. If I fail to get one of these, I fail to reproduce the emotion.

Further, we would expect the suggested emotion to vary as one or another coefficient of reality attaches to the revived experience. When an event is remembered and recognised as a real event in my past life, the emotion it arouses has a new quality from the fact of its present real setting. I may remember my past object of wrath with present gratitude or affection, my past hopes with present regret, my past fears with present complacency. Or I may voluntarily banish my present flow of thought, reinstate all the conditions of the first experience, and thus bring back the original emotion. In case of the memory of sensational experiences, the reality feeling is much stronger and the same emotion comes back with more or less force. This is because the object is in these cases bound more closely with my own feeling, and with difficulty put in a new emotional setting.

As far as the same emotion is revived, it is not simply a picture of a former state, but a real state of feeling. When I remember a pain, I am in pain; but not necessarily in the same pain. For example, I remember vividly a toothache, I have a real pain at present, but it is not a toothache. By the fact of memory, it has lost its sensational coefficient, but it has the memory coefficient, and is real. It may by

its intensity become a real toothache, *i. e.*, get its sensational coefficient again, thus becoming an illusion. The picturing of the facial elements of expression is the most immediate representative means of awaking similar feelings—a widening of the fact already noted of the emotion of sympathy.

This affords an explanation of what is known as the contagion of emotion in crowds, and on a broader scale, in common sentiments in communities and states. In a crowd, fear will spread with amazing rapidity, probably by the semi-unconscious interpretation of muscular and vocal expression. So the styles of taste, morality, and custom are inhaled, so to speak, from the emotional atmosphere in which we live.

Transfer of Emotion by Association. It is a matter of clear experience, also, that emotional excitement gets transferred by association to ideas by which it is not originally aroused. The color black has become doleful and sad from mourning associations, the sight of the postman in the morning brings joyful emotion; in fact, interests of the deeper kind, as has been already remarked, arise from the expenditure of emotion or action upon things at first uninteresting. The whole range of symbolism and suggestiveness in art rests upon this fact of accrued feeling, when the ideas from which it has accrued have become vague or subconscious.

Conflict of Emotions. All mental conflicts are conflicts of feeling. So-called conflicting ideas are those which are *felt* to be in conflict, *i. e.*, those which introduce conflict into the life of feeling. So the much talked of conflict of feeling and reason is purely a conflict of feelings. Reason here means the moving aspect of thought, the strength of truth in setting the subject into action. I might apprehend a truth clearly and yet find no conflict between it and my life which denies it. It is only as it moves me, as I have an emotion for it, that it makes a conflict for supremacy. But

emotional conflicts are real and tragic, especially when they play around questions of duty. And it is the degree of persistence and strength of the underlying ideas that gives and takes the victory. Emotional conflicts, therefore, indicate the hold that various kinds of truths have upon the agent. One man surrenders to the sensational coefficient; the sensuous; another gets an easy victory for the distant and ideal; while a third lives a life of irresolution or decision according to the accidental appeals of one truth or another.

§ 2. Duration of Emotion.

It is, of course, only a truism to say that emotions last only as long as their causes last, but the twofold basis, physical and intellectual, of emotion gives the truism some special bearings. Cases are recorded of the absence of the intellectual object and the continuance of the emotion, its expression being obtrusive and vehement. It is less frequent, but real, also, that emotional expression may be apparently lacking, as in intense æsthetic, ethical, and spiritual feeling.

Emotional Cessation and Relief. It follows also, from the foregoing, that relief from emotion may be artificially courted. Indulgence in strong outbursts of feeling tends to allay their causes; it exhausts the nervous processes involved and induces other emotions. Knocking a man down satisfies my feeling of vengeance more from the new emotion of justice or honor vindicated than from nervous expenditure; but both satisfactions are real. Relief by nervous expenditure follows, especially, in cases of emotion which excite to action. It is always a relief to have done something in an emotional emergency whether it be successful and wise or not.

Again, there is a great class of emotions which sharing tends to relieve. Novelists make much of the smoldering *motif* in the growth of feeling. The immediate effect of

sharing a personal emotion is to temper it by the sense of sympathy and social community. Psychologically, several elements enter in this sense of relief: a feeling arises that the friend confided in justifies and defends the emotion; also, a feeling that help and support are secured. And there is further relief by the cessation of the feeling of isolation and loneliness which is the reverse of social feeling.

Relief from sharing is, however, temporary unless assisted by other agencies. And the return of feeling is more intense from the sense of social support. Apart from its immediate effects, which are largely nervous, sharing deepens emotion by fixing the ideal causes in the attention, expanding the reasons for feeling fully in consciousness, and giving additional associations to keep it constantly in mind. Mourning garments, cards, etc., undoubtedly keep grief alive. We often have emotions because we feel that it is expected of us.[1] Yet often one of the old associations that has long seemed the dried channel of a forgotten joy or grief empties upon us an overwhelming flood of sweet or bitter memories. Such experiences we call revulsions of feeling, and they sometimes give a new turn to the permanent current of the affective life.

[1] When nine years of age the writer lost a brother, and his memory of mourning is largely of his consciousness of the importance of the occasion and his desire to do himself and his family credit by his decorument

PART IV.

WILL.

MOTOR ASPECTS OF SENSUOUS FEELING.

CHAPTER XXIII.

THE MOTOR CONSCIOUSNESS.[1]

§ 1. Idea of the Motor Consciousness.

By the motor consciousness is meant the *ensemble* of elements in consciousness, contributed in any way by the motor apparatus. If there be consciousness of the condition of the motor areas in the brain, of the process of the outward flow of the nervous current, of the movements taking place or having taken place—all are elements of the motor consciousness. The phrase, therefore, is most general; and it may be defined as *consciousness in so far as it is concerned with muscular movement.*

Law of Mental Dynamogenesis. Empirical observation tends overwhelmingly to confirm the inference we would expect from the law of nervous dynamogenesis,[2] *i. e.*, that *every state of consciousness tends to realize itself in an appropriate muscular movement.* The nervous application of the law leads up at once to its application to sensibility. If every ingoing process produces an outward tension, or tendency to muscular discharge, and the more intense and integrated conditions of the centers be more delicately adjusted to such a play of incoming and outgoing processes, then we would expect elements of consciousness

[1] Cf. *Handbook of Psychology*, vol. ii. chap. xii.

[2] Above, p. 28.

peculiar to the motor reaction. That is, we would expect the affective consciousness to merge into the motor consciousness, just as the ingoing nervous process tends to the discharge of energy into the outgoing courses.

The analogy, therefore, may be put something like this: the nervous system in its development has taken on the two functions called stimulation and reaction. When consciousness arises it is at least—whatever else it be—an aid through pleasure and pain to the life process, and to the further development of the system. Analogy would lead us to look, therefore, for this new factor in connection with each of the two essential nervous functions, stimulation and reaction.

The concomitance of the nerve processes and the scious states, if the above analogy holds in a s ple way is shown in Fig. 16, which represents the normal motor consciousness by means of the "motor square"; in which circles (o) represent elements of consciousness and crosses (x) nervous processes. (Cf. Fig. 12, p. 46.)

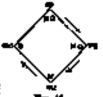

FIG. 16.

Variation of Motor Consciousness. If it be true that all states of consciousness tend more or less strongly to bring about appropriate muscular reaction, we should find several phases in motor consciousness. And this is true. It is our task, accordingly, at this point, to trace the motor bearing of the different kinds of consciousness which have been already distinguished, *i. e.*, to discuss the motor value of the subconscious, of reactive, and of voluntary consciousness, respectively.

§ 2. MOTOR VALUE OF THE SUBCONSCIOUS.

The facts already adduced to illustrate subconscious phenomena are largely motor facts. Motor phenomena which fall below the threshold of conscious reaction, belong partly

to the subconscious and partly to the unconscious; that is, partly to very weak sensibility and partly to sentience. But it is impossible to draw a line of distinction between them, and the attempt to do so would be quite artificial. We shall, therefore, mass such reactions together under the above heading, claiming, at the same time, license to include those reactions which are, as reactions, purely nervous.

In the case of a subconscious reaction, we come across the curious fact that a nervous process itself insufficient to call out sensibility may have muscular effects which are quite sensible. We respond to stimuli which we do not discern, and which we fail afterward, perhaps, to discover by introspection. We often speak or write words which we do not mean and have not been thinking of. Associations often lack conscious links. We respond to a settling chair by balancing the body, to differences in the material we tread upon by increased muscular tension. In short, close observation leads to the conclusion that we are constantly alert to our surroundings when we are apparently unconscious of them. The whole class of co-ordinating reflexes already described belong here. The most unmistakable class of cases covers suggestions made in the hypnotic state which are carried out many days afterward in the normal state, the individual being unable to give any reason for his action. In this case, we seem to have absolute unconsciousness, a physiological reaction apart from any modification in the major consciousness, whatever we may say about the existence of a secondary consciousness. There are other states which are very vaguely or dimly conscious, such as presentations of objects, or memories of events, so habitual as to be reacted upon without attention. We walk about our own house, hang our hats up, and rub our shoes, and then, when asked, are unable to tell whether we did any such thing or not. We wind our watch at night, and learn the fact later only by trying to wind it again. We suddenly discover ourselves half dressed in the

morning in garments we had decided to wear no more. We take a walk, forget our errand, and soon "rein up" in the most unexpected part of the city. In the horse-cars we brace ourselves from the jolting, move up and give another half the seat, and often pay our fare without taking our attention from the morning paper. A nervous man will arrange his necktie or stroke his mustache fifty times a day without "knowing" it, and all of us have our little motor habits, which we are conscious of, but do not observe. Perhaps as clear a case of direct adaptation of our movements to objects of which we are only passively conscious, is the way we pass about in a well-filled drawing-room when wrapped in thought, avoiding all obstacles by a most circuitous and irregular route.

§ 3. Motor Value of the Reactive Consciousness.

The reactive consciousness has already been characterized with sufficient clearness. It is marked off from passive consciousness by the presence of a reaction of the attention, *i. e.*, by the presence of reflex attention.[1] The term reaction brings clearly out the fact that, in such cases, the attention is in response to an unexpected stimulus. As has been said above, there is just as truly a reaction in consciousness as there is in the nervous system, although the elements of the reaction are often thrown out of their true order when taken up into the discriminating process. For example, I hear a loud, unexpected sound, and turn my head involuntarily in the direction from which it seems to come. The order of events appears to be this: first, the sound; then my sensation of sound; then the attentive

[1] The relations of these so called kinds of consciousness to attention may be illustrated as follows:

$$\text{Consciousness}\left\{\begin{array}{l}\text{Passive}\ldots\ldots\ldots\ldots\text{Diffused}\\ \text{Reactive}\ldots\ldots\ldots\ldots\text{Reflex}\\ \text{Voluntary}\ldots\ldots\ldots\text{Voluntary}\end{array}\right\}\text{Attention.}$$

impulse carrying with it, first, the grosser movements of the head and trunk, and afterward, the finer movements of the eye-muscles, etc., engaged when the attention is concentrated; then a discrimination of the sound through the attention; and finally, a motor response to it. This is not the order, however, in which I myself apprehend or recognise the different elements in the reaction. About the first thing I *know* in such a case is that I have suddenly turned my head and body, and am concentrating my attention upon something which I now subsequently learn to be a sound.

Elements of the Reactive Consciousness. Taking the reaction, then, as a felt reaction, and considering its elements in the order made typical in cases of nervous reaction, we find, first, a *stimulus to the reactive consciousness*, *i. e.*, whatever affective or feeling element in consciousness calls out an involuntary act of attention; second, *the feeling of expenditure* in an act of attention which is drawn out without volition, whatever this feeling may be found to include; and third, *the feelings of the muscular movements* appropriate to the particular stimulus.

Of these three elements of the reactive consciousness, the last may be considered as comprehending only the feelings of movements already executed; that is, feelings coming in from the grosser muscles of the body, etc. These constitute a clear kinæsthetic or efferent contribution to the motor consciousness.

The *stimulus* in this form of consciousness is treated in a later connection; so it remains for us to inquire into the feelings which properly belong to the act of involuntary attention itself, so-called feelings of *expenditure*. And they must be considered independently of feelings of voluntary effort; if we are able to reach a coherent conclusion regarding expenditure alone, it will be of great service to us when we come to consider effort.

§ 4. Feeling of Expenditure in Attention.

Description. Inspection of an act of involuntary attention leads to the detection of the following elements.

1. *Feeling of Readiness to Attend: Mental Potential.* Such a feeling of readiness or *potential* has already appeared in connection with muscular movement. Muscular freshness and vigor pervade the entire organic system; so readiness to give attention or to do intellectual work is a clear and well marked state of consciousness. And the two seem to be, in part at least, distinct from each other. After confining myself to my writing table all the morning my attention loses its elasticity and readiness of concentration; but my muscular system begins to feel an overabundance of energy, a pressing readiness for exercise. And when I give up my intellectual task and indulge my craving for exercise, I have a peculiar feeling of throwing off the mental weight, of getting rid of the thraldom of ideas, in the easy enjoyment of muscular activity. However we may account for it, the difference in consciousness between feelings of intellectual and of muscular *potential* is well marked. Intellectual readiness probably includes both nervous and muscular freshness.

2. *Feeling of Fatigue of Attention.* The state of the case is about the same between intellectual and muscular fatigue. The question whether there is nervous fatigue apart from the fatigue of particular muscles has already been adverted to. It is difficult to divide this question in two parts and suppose purely intellectual fatigue apart from nervous fatigue. The feeling of fatigue in attention may be taken, provisionally at least, to include, first, fatigue of the nervous system, either in the sensorium as a whole, or in the particular elements which are brought into play in the activity which occasions the fatigue, and, second, an element of lowered muscular tone.

3. *Feeling of Activity in Involuntary Attention.* The

central point of expenditure is reached in the feeling of actual activity during the attention. If readiness precedes the attention, and if fatigue follows it, what feeling do we have during it—at the very moment of it? Is there a feeling of activity, apart from the feelings of all kinds now described?

Sensorial and Intellectual Attention. Further, involuntary attention is either *sensorial*, *i. e.*, terminating on a part of the body or on an object, or *intellectual*, *i. e.*, terminating on an image. The case of the sound which causes a start is typical of the former: the play of images in passive imagination, or reverie, when all control is withdrawn, illustrates the latter. The question before us may be put separately for these two cases; and the word "thought" will be used to designate the play of ideas in apperception, apart from any voluntary influence we may have over them.

The problem of the feeling of attention is thus simplified, and three plain questions now confront us: First, are we conscious of nervous outgo from the brain, or is our consciousness only of the effect of such outgo? Second, are we conscious of an activity of attention or thought, or only of the effects of such an activity, that is, of thinking thoughts, or only of thought thoughts? And third, are these two forms of consciousness one and the same thing?

§ 3. Theory of Feeling of Activity in Reflex Attention.

Association or Effect Theory of Reflex Attention. This theory regards reflex attention as an associated mass of incoming muscular feelings and memories of such feelings. It accordingly holds, in answer to the third question, that the feeling of sensorial attention is the same in kind as that of intellectual attention, the feelings involved in the two cases arising from different classes of muscles and muscular memories. Thus sensorial attention involves feelings from limbs moved, with their traces left in memory

while feelings of intellectual attention are only from certain muscles of the eye and eyebrow, skin of the skull, respiration muscles, etc., with memories of former acts of attention.

Without citing detailed evidence this position seems well made out; it suffices, in proof, to observe that the feeling of muscular expenditure is not present when the attention is entirely absent. If my arm is raised mechanically by a friend who comes softly behind me and grasps my hand I do not feel muscular expenditure; the feeling is quite absent. After many such movements I begin to feel fatigue, it is true, but it is clearly muscular fatigue: an effect reported by the afferent process. The same is seen in cases of sudden twitching of the muscles, due to isolated discharges in the brain, and in pure reflexes: they are known only after their occurrence. Consequently the third question may be thus disposed of.

In the next place, this theory replies to the second question, above, *i. e.*, Are we conscious of the activity, process, of thought, or are we conscious only of the product of thought? of thought relating, or of thought relations? The answer is that we are conscious only of the latter, of thoughts after they are thought. Whenever we catch ourselves thinking either we feel that we have just thought something or that we are just going to think something. There is no process between the absence of the second term of my thought and its presence, no gap at all. For example, a loud sound calls my attention; there is no interval of conscious thinking, no feeling of thinking, between the absence of the sound and its presence. The whole case is a succession of feelings thrown into temporary confusion by a new feeling, and the *awake*-feeling that results, when I recognise the sound, is only the fortunate circumstance that the series ends in a feeling that is familiar. Even granted, moreover, that there is a synthesis in thought, yet it is known by the presence of such synthetic constructions

in thought, not by any consciousness of the process of making them.

This point, again, seems to be well taken as regards the actual elements in consciousness at any given stage of thought. It is a mistake to say that we feel a synthetic activity in consciousness when volition is absent: all that we feel is the coming together and disjoining again of elements. That this is the result of an activity is an implication, a necessary presupposition, not a felt fact.

Accordingly only the first of our three questions remains for this theory to give reply to, *i. e.*, Are we conscious of nervous currents as they pass out of the brain, or are we conscious only of the effects of such currents in actual movements of the muscles? The question is here limited to cases of reactive consciousness or reflex attention, as before.

The affect theory is not slow to answer this question in accordance with its general tenor. Its advocates challenge their opponents to produce any case of such feelings of expenditure that cannot be explained in terms of afferent sensation. The present state of the discussion is briefly indicated in a later connection.[1]

§ 5. Conclusion on Reflex Attention.

From the foregoing the conclusion is that as far as there is a consciousness of self in reflex attention it is an objective, felt self, rather than a subjective, feeling, active self. Whatever ground may be found subsequently for such an active executive self, we find no such ground here.

This conclusion is thrown into prominence by the entire group of facts of hypnotism. Here the subject is quite and entirely reactive. His consciousness of his own power of choice, exertion, initiative, is gone, and the mechanical nature of his nervous processes works up through the relational consciousness which he still has. Instead of having

[1] Below, chap. xxvi. § 1.

a suggestion from without, let us suppose him acting from simple sense-stimuli, or from memories thrown into his consciousness from within, and the whole case is plain before us. Whatever feeling of activity a hypnotized man may have, it is evidently an activity of his nervous system, as it reflects the activity of the mind of someone else.

CHAPTER XXIV.

STIMULI TO INVOLUNTARY MOVEMENT.[1]

Notion of Stimulus. An involuntary reaction in movement has already been analysed into its three aspects or parts, *i. e.*, stimulus, consciousness of reaction, and actual movement. Further, the second of these elements has been reduced to the third in cases where volition does not enter. Leaving the third for discussion in connection with voluntary movement, it remains to inquire into the nature of the various stimulations which issue in conscious but involuntary reaction.

By stimulus is meant the affective experience of any kind which tends to issue in conscious motor reaction. Looked at from the side of the nervous system it is the new element of tension, whence ever it comes, which disturbs the equilibrium *outward*. And from what we already know of the nervous system we readily see that such new elements of tension may come either from some condition of the nervous organism or from outside the system. Accordingly stimuli to the reactive consciousness may be distinguished as *organic* and *extra-organic*.

§ 1. Kinds of Motor Stimuli.

I. **Extra-organic Stimuli to Movement: Reflexes.** The various special kinds of stimulation, as light, sound, etc., have already been sufficiently discussed, as also have the external causes of the more obscure phases of sensibility.

All reflexes are stimulated from without, and they cover a wide range of phenomena. They occur in earliest child-

[1] Cf. *Handbook of Psychology*, vol. ii. chap. xiii.

hood, *i. e.*, sucking, winking, and probably the first essentials of walking—a reflex alternation of the legs—swallowing, etc.

Suggestion as Motor Stimulus.[1] By suggestion is meant a great class of phenomena typified by the abrupt entrance from without into consciousness of an idea or image which becomes a part of the stream of thought and tends to produce the muscular and volitional effects which ordinarily follow upon its presence. I suggest a course of action to my friend—he may adopt it. Besides this fact of ideal suggestion there is what may be called *physiological suggestion*: covering the same class of phenomena in cases where the suggestion does not attain the standing of a conscious image, but remains subconscious. It is called physiological because the nervous process, as in all cases of very faint degrees of consciousness, is largely self-acting or reflex. By physiological suggestion, therefore, is meant the *bringing about of a reaction subconsciously by means of an extra-organic stimulus.*

The clearest examples of such suggestions occur in sleep. Words spoken to the sleeper get intelligently answered. Positions given to his limbs lead to others ordinarily associated with them; the sleeper defends himself, withdraws from danger, etc., etc. The early development of the child's consciousness proceeds largely by such suggestions. Before mental images are definitely formed and subject to association we find many motor reactions stimulated by such physiological suggestions from the environment.

From physiological the child passes to *sensori-motor* suggestion, the type of reaction which illustrates most clearly the law of dynamogenesis already stated.[2] In this case it is a sensation, a clear state of consciousness, which

[1] Cf. the writer's observations upon his child in *Science*, xvii. (1891), pp. 113 ff.

[2] Above, p. 303.

liberates motor energy and produces movement. Besides the inherited sensori-motor couples, which are numerous and well marked, other reactions grow up early in life and become habitual. Of the latter the following may be mentioned in particular:

1. *Sleep-suggestions.* The early surroundings and methods of inducing sleep become powerful reinforcements of the child's drowsiness, or even substitutes for it.[1]

2. *Food and clothing suggestions.* These represent the spheres of most frequent and highly spiced joys and sorrows, and their reactions soon take on the involuntary and yet highly purposive character which marks our adult attitudes toward dress and the table.

3. *Suggestions of personality.* The child shows preferences for individuals at a remarkably early age. He seems to learn and respond to a personal *presence* as a whole. Probably the voice is the first indication of his nurse's or mother's personality to which he responds, then touch, then the sight of the face.

4. *Imitative suggestion.* The simple imitation of movements and sounds, clearly manifested about the seventh month of life.

In *ideo-motor* or *ideal* suggestion we pass to the motor aspects of images, reproductions. And here the motor accompaniments are largely associations and follow the laws of association. As soon, further, as reproductions come up, with their suggested trains, we find the rise of will: that is, they become stimuli to the voluntary consciousness—a topic for later discussion. Yet there is a state of conflict and hindrance among presentations which is mechanical in its issue, the attention being drawn in a reflex way. So states of vexation, divided counsel, conflicting impulse, and hasty decision against one's desire for deliberate choice. We often find ourselves drawn violently apart, precipitated through a whirl of suggested courses

[1] See the writer's detailed observations, loc. cit.

into a course we feel unwilling to own as our own. This is the case in the disease called *aboulia*, or loss of will. The man is prey to conflicting impulses. This state, called by the writer *deliberative* suggestion, characterises many actions of the young child before will is clearly exercised.[1]

II. **Organic Stimuli to Movement.** Again, the results of the former classification of the organic sources of feeling serve to cover a great area of the present topic. In general, any condition of the organism, be it active or passive, which is sufficient to reach consciousness, tends to muscular expression, either natural or acquired. Any derangement of the digestion, respiration, or circulation quickens or deadens muscular tone, and comes out, if not in the face, yet in the conduct of the man. The muscular feelings themselves, so large a portion of the "general sensibility," reflect direct changes in the tendency and direction of motor reactions. Diseases of the nervous system find their diagnosis in their effects upon the muscular apparatus: paralysis means rigidity; epilepsy, convulsions; sleep, flabbiness of the muscles. The effects of organic stimulation upon the motor consciousness is best seen in conditions of pleasure and pain.

Expressive Reactions. Among direct or native reactions an important class are called *expressive*; they are differentiated muscular movements which reflect uniformly various affective states of consciousness. These reactions have already been discussed above.[2]

Pleasure and Pain as Stimuli to Movement. Perhaps the most direct and invariable stimulus to involuntary movement is pain. And its motor force is independent, as it seems, of the intrinsic experience of which it is the tone. The motor force of a sensation of light, for example, may be in direct antagonism to the motor force of the pain which the light causes to a diseased eye. Despair begets

[1] See the article just cited for a detailed example.

[2] Above, p. 300.

inaction, but the painfulness of it begets restlessness. This is only to say that the tone is an element of sensibility apart from the sensation it accompanies, and that both the one and the other have motor force.

Yet the fact that there are no experiences absolutely indifferent as respects pleasure or pain gives the motor aspect of them an universality and importance which must be acknowledged and provided for in any mental theory. It is a question answered often in the negative whether any course of conduct is ever pursued without primary reference to the pleasure it will bring or the pain it will avoid. However this question may be answered, it may be said at this point that no line of muscular reaction is possible in which an element of motor discharge due to pleasure or pain has not entered. This must be true if the fundamental position is true that every ingoing process alters the equilibrium of the central system and modifies the direction of its outward tendency. Pleasure and pain arising from bodily states may, therefore, be called the most general internal stimuli to the reactive consciousness.

Nature of Pleasure and Pain Reactions. We have already seen that moderate activities are generally pleasurable. It would be expected, therefore, that pain would have a deadening and quieting effect upon the muscular system: that such an effect would tend, by reducing muscular activity to a moderate amount, to alleviate the pain and induce pleasure. It may, as a fact, be said that a *painful motor reaction tends to suppress itself.*

Again, in cases of extreme pain, we would expect, in addition to the above, that the activities of other motor elements would reinforce the inhibitory process, *i. e.*, draw off energy from the painful reaction. Accordingly we find that *violent pain stimulates a diffused and convulsive motor reaction.*

And yet again, since pleasure accompanies moderate function, we would expect the same two considerations to

operate for the continuance of a pleasurable reaction; namely, that the life process would be furthered by the repetition of a pleasurable reaction, and by the quieting of other activities which interfere with it and dissipate its energy. Hence we may say, a *pleasurable motor reaction tends to persist.*

Motor Spontaneity. The observation of infants clearly tends to show that movement is no less original a fact than feeling. It is impossible to say whether all antenatal movements are in response to feeling conditions, as claimed by some, just as it is impossible to prove that the beginning of feeling is possible only after sufficient physical organization to make motor reaction possible, as claimed by others. It is altogether probable that the two kinds of phenomena are equally original, and depend upon each other. This is certainly the case, at any rate, at the dawn of independent life. Internal conditions of the organism itself are sufficient stimuli to an endless variety of movements. Such reactions, which are simply the discharges, the outbursts, of the organism, independent of definite external stimulation, are called *spontaneous.* So the incessant random movements of infants and the extraordinary rubber-like activity of the year-old child.

The movements of infants seem to indicate greater intensity of motor feeling than is found in adults. A child's extreme restlessness is due to a high feeling of *potential* or readiness of discharge; and fatigue is accompanied by a correspondingly complete collapse of muscular movements. This follows from the mobility of the infant's cerebral elements before they are pressed into definite connections and systems which give them greater inertia, on the one hand, and greater general capacities for continued expenditure on the other.

Upon this superfluity of motor energy is built up the so-called *play-instinct*, which is not definite enough in its channels to be classed properly as an instinct. The energy

of the muscles is brought under voluntary control to gratify other senses than the muscular sense itself. Educationally, play is important, as tending to give the child mobility of movement, and a sense of arrangement, form, and complex situation; it is also a valuable aid to the growth of the inventive and constructive faculty.

§ 2. Impulse and Instinct.

In the foregoing section the stimuli to the reactive consciousness have been seen to come from within or without the organism. As originating mainly within they may be called in general *impulsive*, and as originating mainly without, *instinctive*. With such an inexact distinction for the present, the more definite inquiry into impulse and instinct may be begun.

Impulse. By an impulsive character we understand one in which activity predominates; but activity of a somewhat capricious kind. We contrast a creature of impulse with a creature of reason. And this means more than that the impulsive individual can give no adequate reason for his outbursts; it means also that no one else can. Impulses are essentially *unreasonable* to the onlooker. They are capricious in the sense that they are, to a degree, idiosyncratic.

In this case, as in so many others, the result of close analysis is only a confirmation of our ordinary definition. Looked at from the side of physiology, sensory and motor processes are such only as they are correlative and antithetic to each other. The physiological unit is an arc, a reaction. Psychologically we find a similar state of things. At the beginning, as far as investigation can discover, there is an element of motor feeling—of going out, as well as of taking in. And this "going out" element gets to itself, wherever we find consciousness, a kind of personality or idiosyncrasy, seen in its selective reactions, and in the kind of character which it builds up. The ribs, so to speak, of consciousness

go in pairs, just as the sensor and motor nerves serve as rib-pairs in the nervous system; and taken together as pairs they constitute, on our last analysis, the foundation of all conscious life. In dealing with sensibility we are dealing with one side of this pair. What sensibility is is an inscrutable mystery: it is an ultimate psychological fact. And the same is true of impulse; it is the other element in the fundamental pair.

Yet, in the way of description, we may make the following observations about impulse, in the light of what we know of physiology and of general consciousness.

1. *Impulse belongs to the reactive consciousness:* it does not involve deliberation and will. A deliberative character is a man who controls his impulses, that is, one who brings his will to bear effectually upon his impulses. On the other hand, very strong and varied impulses tend to overpower and paralyze the will. Impulse should therefore find its general condition in the physiology and psychology of the involuntary life. It follows that the end of impulse is not pictured in consciousness.

2. *Impulses are never quite beyond control in normal circumstances.* They are sufficiently internal and unreflex to be subject to voluntary negation. Yet their influence upon the volitional life may be very great, as appears later in the consideration of them as motives to action. In cases of long indulgence or weak resolution their subjugation can only be indirectly accomplished; that is, by the active pursuit of other lines of activity, by which the force of the unprofitable impulse is drained off into adjacent channels.

3. *The idiosyncratic character of impulse must be due largely to constitutional tendencies of individuals derived from inheritance or from peculiar conditions of life.* The effects of inheritance in this particular are very marked. Nothing is so evidently inherited as active temperament. And in the individual life the growth and decay of impulse is also easily observed. Discouraging circum-

stances or continued ill fortune may reduce a man of hopeful impulses to a prevailing pessimism and lack of interest. This characteristic individuality of impulse prevents its division into classes, and makes it impossible to formulate for single impulsive reactions any exact laws of stimulation.

4. *Impulse is, therefore, internally stimulated: and cannot generally be analyzed into definite reflex elements.* This is true on both the physiological and the psychological side. A physiological impulse cannot be traced directly and uniformly to a particular stimulus: it seems to be rather the outcome of what is peculiar to the central process, and to result from the growth of the system. And, on the other hand, we cannot trace impulses in consciousness to uniform psychological antecedents. They seem to represent the state of consciousness as a whole, apart from the theoretical worth of particular images. Impulses of fear in nervous persons are, and persist in being, quite independent of argument and persuasion. Our reasoned conclusions frequently have to fight their way through many opposing impulsive tendencies.

Yet it is generally through the presence of some definite object or image that impulses are clearly manifested. What may have been a vague feeling of unrest or disquiet turns into an impulsive motor reaction whenever it finds its appropriate object, as Jessen remarks.

Definition of Sensuous Impulse. Accordingly we may define sensuous impulse psychologically as *the original tendency of consciousness to express itself in motor terms as far as this tendency exists apart from particular stimulations of sense.*

Kinds of Sensuous Impulse. Confining ourselves for the present to the sensuous side of impulse, we find that such tendencies are either *positive* or *negative*—*toward* or *away from* a present stimulating object. The impulses following pain are away from the cause of pain, those arising from pleasure toward the source of pleasure. They do not in-

volve, however, definite purpose, or the adoption of conscious ends. The purposive character which they have is a case, as far as psychology goes, of original adaptation.

Farther, such impulses are either *furthering* or *inhibitory*, respectively, of motor reaction. The effect of moderate pain is, generally, quieting or inhibitory. Yet an important class of physical pains induce definite and violent motor agitation: these are the discomforts arising from physical lack or unsatisfied appetite. All the *animal appetites* are native and their appropriate motor apparatus comes into impulsive activity. The impulses which spring from pleasurable states are uniformly furthering.

Instinct. The general word impulse was given to the more complex motor tendencies as far as they are internally initiated: similarly, complex reactions which are stimulated from the environment are called *Instincts*. The division between the two classes is thus a broad line of demarcation, subject to exceptions and anomalous cases on both sides. From the standpoint of common observation two great characters seem to attach to instinct: first, they are considered a matter of the original endowment of an organism, and further, they are thought to exhibit the most remarkable evidence in nature of the adaptation of organisms to their living medium.

Assuming in advance that instinct is a complex motor phenomenon stimulated *from* without, empirical observation enables us to make the following remarks in the way of further description.

1. Like impulse, *instinct belongs to the reactive consciousness.* This is now sufficiently understood.

2. Ordinarily *instinct is not under voluntary control.* Here the case differs from the phenomenon of impulse.

3. *Instincts are, as a rule, definite and uniform:* they lack the idiosyncratic and individual variations of impulse.

4. *Instincts are correlated with definite stimulation, to which they afford reflex reaction.*

In saying that instincts are reflex we bring to mind all the characteristics of such reactions: their mechanical nature as fixed types of nervous process, their irresistibleness as phenomena of consciousness, their particular forms as belonging to distinct animal species. They represent the consolidated nervous structure which is transmitted by inheritance, and the low form of consciousness which has not character enough to be impulsive.

In saying that they are reflex it is further meant that instincts do not carry consciousness of the effects which they work. The hen, when she first "sits" on her nest, has no picture of her future brood, and no purpose to hatch her dozen eggs. In saying she has an instinct to "sit" we mean that when her organic condition (warmth, etc.) is so adjusted to the environment (nest, eggs, etc.) that hatching will ensue, she sits by a necessity of her reflex nervous organism. So we cannot say that migratory birds have a picture of the country to which they fly for the first time, or an anticipation of the congenial warmth of a southern clime: all we can say is that, atmospheric and other conditions acting as stimuli, the bird's migratory instinct shows itself as an appropriate motor reaction.

Complexity of Instinct. But the simple concept of reflex reaction needs some modification in view of the marvelous complexity of observed instincts. If the purposive adaptations of the organism were limited to a single reflex arc, *i. e.*, to a sense-stimulation and a muscular movement in reaction, the life of the animal world would be cut off at a low level of development. The adaptation to its environment on the part of the nervous system must gain this complexity in two ways: first, by a co-ordination of muscular elements in a single group for a common end—what we may call a *coexisting complexity;* or, second, a union of successive motor reactions in a dependent series for a common end—what we may call a *serial complexity.* Both of these are realized in animal instinct. The bird's nest-

building involves both the simultaneous performance of many muscular reactions and the long succession of movements in flight, etc., from day to day, which in voluntary life we call the employment of means to end.

Definition of Animal Instinct. From the point of view of consciousness, instincts are *original tendencies of consciousness to express itself in motor terms in response to definite but generally complex stimulations of sense; i. e., they are inherited motor intuitions.*

Variability of Instinct. This general theory of instinct is further strengthened by the fact of variability, possible modification, or entire loss of an instinct by reason of changes in the stimulating conditions. Recent observations have established this point beyond question. The child loses the power of sucking after he has been weaned; and if he re-learn it, it must be by a gradual process. Birds in confinement lose the nest-building instinct. Bees will so modify their hive structure as to overcome new and quite artificial obstacles, while still retaining the architectural principle essential to economy of material. We accordingly reach a broad class of phenomena which seem to lie on the border line between impulse and instinct, as now defined, and which tend to bring unity into this phase of conscious life. The facts may be gathered under the following points:

1. *Decay of Instinct from Disuse:* a principle which explains itself. Physiologically it means the encroachment of nervous combinations, which are used upon the material or connections of such disused instincts, the result being a readjustment of elements in a way which destroys the former instinctive reaction.

2. *Modification of Instinct from Imperfect Adjustment.* This means the reversion of reflex co-ordinations to a less complex type. The bird that has lost the nest-building instinct may still retain the egg-laying and mating instincts, although in a wild state it is difficult to draw any

line of division between them. The adaptation of the reaction to that degree and kind of stimulus actually present is wonderful, but still a fact. It is probable that this modification of instinct is due in part to the influence of memories of earlier experiences, the present elements of stimulation working by help of reinforcement from their own memories. In this way the elements essential for a present reaction are emphasized. Imitative suggestions tend, in the same way, to modify instincts. Voluntary selection, also, breaks up instincts, until in many cases only the impulses remain, so to speak, instinctive.

3. *Natural Exhaustion of Instincts.* Many instinctive reactions naturally spend themselves and die away. Thus the infant's sucking instinct, the gregarious instinct in some, the bashful instinct in others. In many cases the instinct of modesty seems to disappear altogether as life advances. So many physical enjoyments disappear and the enthusiasms of youth fade and perish together. Such instincts represent phases merely in the life history of the physical and mental organism.

§ 3. Affective Nature of all Stimuli to Movement.

Affects. In the foregoing notice of different classes of stimuli the fact has been assumed that they are all phenomena of feeling. We feel the force, the motor worth, of a suggestion, a pain, an impulse. An idea simply as an idea—if such could be realized—might not react in movement; but the simple presence of an idea in consciousness is itself a feeling, and only in as far as it affects us does it move us.

We may accordingly apply the term *affects* to all stimuli to involuntary movement. When I am affected I am moved through my own inner state of sensibility. And such affects also figure, as will appear, in the voluntary consciousness as well; but there they stand in contrast with another great class of stimulations, which together

with them constitute *motives*. Affects, therefore, are the antecedents of involuntary movements, as motives, including affects, are the antecedents of acts of will.

Division of Affects. From the above description of motor stimuli we may conclude that involuntary movement, when not spontaneous and not a simple reflex—that is, when it is stimulated through consciousness—results from one or more of the causes in the following table:

$$\text{Stimuli}\begin{cases}\text{Pleasure and pain.}\\ \text{Suggestion.}\\ \text{Impulse.}\\ \text{Instinct.}\end{cases}$$

MOTOR ASPECTS OF IDEAL FEELING.

CHAPTER XXV.

STIMULI TO VOLUNTARY MOVEMENT.[1]

The Voluntary Motor Consciousness. The general analysis already found convenient for the reactive consciousness holds for the voluntary. We find that in all cases of intended bodily movement there is, first, a reason why we will the reaction; second, the actual decision or act of will; and third, the resulting movement. All the "reasons why," taken together, constitute *stimuli to voluntary movement*, and they may be considered first.

§ 1. General Stimuli.

I. **Interest in an Object.** The most evident characteristic of intentional action is that something is intended, *i. e.*, that a presentation of some kind is set before consciousness. The notion of an end foreseen, which we found absent in instinct and impulse, and undefined in ethical feeling, here becomes explicit. Psychology finds here, in common phraseology, one of its safest distinctions.

Yet it is easy to see that an object thus presented or apperceived must carry some interest in order to be pursued. I will to move my leg, either that I may walk—my present interest; or that I may relieve a strain—also my present interest. Some degree of present emotional interest, therefore, may be said to be the most general stimulus to volition.

[1] *Cf. Handbook of Psychology*, vol. ii. chap. xiv.

Origin of Volition. As the young child's earliest interests are its crying physical needs, it is probable that voluntary movement takes its rise in the adjustment of spontaneous and reflex movements to varying conditions, of suggestion and impulse. As a fact, we find the random movements of the infant very soon taking on the character of tentative voluntary imitations and explorations. I hold that the first clear cases of volition in the child are seen in "persistent imitation"—its "try, try again," in imitating movements seen and noises heard.[1] These nascent efforts and their reverses gradually give rise to well-formed beliefs in points of objective reality, upon which voluntary reactions become rapidly habitual.

II. Affects as Stimuli to Voluntary Movement. The influences which bear on voluntary movement are farther and explicit expressions of the influences already found to affect involuntary reaction. The general law that sense-modifications tend to pass off in motor reactions bears right up into the voluntary sphere. *Suggestion* which produces involuntary movement tends to produce voluntary; so of *pleasure and pain*, *emotion*, *impulse*. The psychology which separates volition from reaction so sharply as to deny any influence upon the will to other stimuli than pictured ideas is false. The conditions back of an act of choice are never limited to the alternatives between which the choice is made. There is beneath it all a dumb, unexpressed mass of affects—organic, partially felt tendencies outward, which give coloring to the whole process. A decision made at night is reversed in the morning, when no new information has been received. A trifling physical accident will distort vision, arouse emotion, and reverse decision. This fact, that our most abstract acts of volition are strongly influenced by subconscious affective

[1] See my paper on "The Origin of Volition in Childhood," *Science*, No 511, 1892, p. 286; also in *Proceedings of Congress for Exper. Psychology*, London meeting, 1892.

conditions, is only beginning to have the recognition it deserves.

§ 2. Special Stimulus to Volition: Desire.

Apart from the more general influences already described we find at the basis of all voluntary movement the great fact of desire. Understanding the term as synonymous with wish—as the words are popularly used—our conception will grow more exact as we proceed.

Impulse as Basis of Desire: Appetence. The remarks already made about sensuous impulse lead to an inquiry as to the ground of the attracting and repelling force inherent in certain emotions. There are original intellectual impulses accompanying and carrying forward the apperceptive processes, as there are physical impulses preserving and furthering the physical life. These intellectual impulses lie at the bottom of the earlier classification of the emotions: *logical* impulse; *self*-impulses, seen in ambition, vainglory, self-depreciation; *sympathetic* impulses, seen in generosity, self-denial, impulse to rescue, bravery for others, etc.; impulses for *ideals*, of truth, the good, and the beautiful. As terminating on particular classes of objects such impulses are often called *appetences*.

Desire and its Objects. The impulsive basis of desire, however, is not the whole. Intellectual impulse is a directed impulse, an impulse conscious of the object of its satisfaction. This objective reference it is that distinguishes *desire* from centrally initiated reactions generally. The distinction is seen clearly in certain experiences of restless impulsiveness which we feel when there is no definite object of desire. Restlessness, both mental and physical, tends to pass off in diffused accidental channels. The shifting, aimless, often destructive, muscular movements of the nervous dyspeptic find their counterpart in similar movements of his attention and emotions. But when this outward tendency is chained down to a

single outlet clearly pictured in consciousness, we have desire.

The object of desire is, therefore, that *after* which desire reaches out; and these objects are innumerable. In general, any presentation whatever that arouses an impulsive movement of consciousness becomes by that fact the object of desire.

Rise of Desire. The first clear cases of desire in the child express themselves by movements of the hands in grasping after objects seen. As soon as there is attention, giving a clear visual presentation of an object, we find impulsive muscular reactions directed toward it, at first in an excessively crude fashion, but becoming rapidly refined. The writer found, in experiments with his own child,[1] that the vain grasping at distant objects which prevailed in a lessening degree up to the sixth month of life tended to disappear in the two subsequent months. During the eighth month the child would not grasp at colored objects more than sixteen inches distant, her reaching distance being ten to twelve inches. This training of desire is evidently an association of muscular (arm) sensations with visual experiences of distance. It is, therefore, probably safe to say that *desire takes its rise in visual suggestion and develops under its lead.* The earlier feelings of lack and need springing from appetite are vague and organic, and cannot be called desires: they have no conscious pictured objects.

Desire and its Tone. The hedonic coloring of desire is always a state of pain, especially when the impulsive tendency is intense or long restrained. It begins with a state of uneasiness or restlessness. The basis of desire, like that of appetite, is a functional need: this state of need or lack is in itself painful, and its gratification pleasurable. But both the removal of the pain and the gaining of the pleasure are conditioned upon the presence of the object upon which

[1] See *Science*, xvi. (1890), p. 247.

the function in question is legitimately exercised. For example, in hunger the lack in the nutritive function is felt as pain; the function is brought into exercise by its appropriate object, food; and the exercise of the function is pleasurable. So with the student, the lack of mental occupancy is painful, the pain is relieved by securing an appropriate subject of application, and the function thus established gives pleasure. Originally, therefore, the hedonic coloring of the satisfaction of desire is purely an accompaniment, not in any sense the object of the desire, unless the pleasure itself be *pictured* to consciousness and intentionally aimed at. Observations of children at the period when volition is arising show that the first stages of volition deal most directly with objects; that the child only learns by degrees to manipulate objects in order to increase or lengthen pleasure, *i. e.*, learns that he can modify his natural reactions and subordinate them to the pursuit of the pleasure which they have incidentally afforded him. The infant's appetites are at first directed to objects which satisfy: he drinks and casts his bottle energetically from him. After some eight or nine months he begins to dally with his bottle, to stop a while and return again, to continue after his appetite is satisfied; and in the child of two years and older the pleasure of eating has clearly superseded the simple desire for food, and has become itself an object of pursuit.

Coefficient of the Desirable. A further question has reference to the attribute or quality of an image which makes it the object of desire. Why is it that there is an impulsive tendency to or from certain presentations? The answer requires a closer analysis of both the mental and the physical conditions involved.

On the mental side it is well to remember that the various coefficients of belief are found in the need-satisfying quality of various mental experiences. In desire the demands for such satisfaction become explicit, and the pre-

sented objects come to have value and satisfying reality according as they afford fit termini for reaction. The reproduction of such an object suggests its appropriate satisfactions, but the representation is wanting in body, reality, coefficient. Here, then, is one attribute of an imaged object of desire, *i. e., the suggestion it gives of satisfactions which it does not bring.*

Further, what are these suggestions? What form do they take? Evidently the form that all suggestions take: motor form. They tend to pass off in the channels of action appropriate to the kind of satisfaction for which they stand. Now either the imaged object is sufficiently real in its connections to cause motor reactions, in which case desire is, partially at least, satisfied, or it is only competent to give what Ward calls "incipient action," *i. e.*, a tendency to react which is held in check by the consciousness of the object's unreality. In this latter case there is continued desire and a second element is reached, *i. e., an incipient motor reaction which the imaged object stimulates but does not discharge.*

These two aspects of desire are equally important. And on closer view we see that they stand in the case of physical desire for the twofold criteria of objective reality with which we are now familiar. These criteria were seen to be, first, present satisfying quality; and second, liability to reproduction at the terminus of a voluntary muscular series. Now desire, as appears above, arises when an image excites consciousness as these criteria would, *i. e.*, suggests satisfaction without giving it, and stimulates a muscular series without providing it a terminus. Or put as a single formula, we may say that an image is desired when it *suggests satisfactions which are neither immediately present nor available by volition.*

Physical Basis of Desire. The conception of the physical process underlying desire must await the conception of the processes which underlie the perception of the different

kinds of reality. If the sensational reality of an object reflects itself in consciousness through a certain brain-process, then the idea of that object would rest upon a process lacking the peculiar element which stood for reality. The motor outlet in the two cases is the same: for the incipient reaction is the ordinary reaction which the object in question calls forth, except that it is incipient. Physiologically, therefore, desire is the brewing of a motor storm: the beginning of what is to be when the discharge has gathered its full force in the presence of the real object.

§ 2. Motive.

All the stimuli to voluntary consciousness now discovered may be gathered under a single term, *i. e.*, *motive*, which shall denote *any influence whatever which tends to bring about voluntary action*. Motives are seen to fall into two great classes according as they represent pictured objects of pursuit, or the subconscious, organic, habitual, or purely affective, springs of action whose main influence is the coloring they give to consciousness as a whole. The former class of motives are *ends*, the latter *affects*. No sharp line can be drawn between them as stimuli; for, as has been seen, they pass constantly into one another. Yet in consciousness the line is both plain and important. As will appear below, it is only ends which are available as distinct lines of direction for volition, in definite cases of choice.

CHAPTER XXVI.

VOLUNTARY MOVEMENT.[1]

So far the springs of voluntary action have been explored. What do these springs lead to? In other words, what is voluntary action? Confining ourselves as before to muscular movement we find two great kinds of experience attaching to all movements which we are willing to claim as our personal performances. These we may call respectively feeling of *effort* and feeling of *consent*. We are willing to claim any movements of our bodies which we consent to, or which we make an effort to bring about. These two feelings may be considered more closely.

§ 1. Feelings of Effort and Consent.

What is meant by muscular effort, as a type of experience, is clear when we examine a particular act of voluntary movement: say lifting the arm to a definite height in front of the body. Omitting the elements already found present in reactive or mechanical movement, two great cases of effort present themselves—cases which we may call *positive* and *negative*: effort *to do*, and effort *not to do*. In positive effort we strive to bring about movement; let us call this feeling the *fiat* of will. In negative effort we strive to put an end to a movement, to control or suppress it: this we may call the *neget* of will. For example, I am charged with not moving a paralyzed arm, and I reply, "No, but I tried to!" This is the fiat. A child is blamed for moving, and he cries: "Yes, but I tried not to!" This is the neget.

There are certain new factors involved in a fiat of will, factors both psychological and physiological.

[1] Cf. *Handbook of Psychology*, vol. ii. chap. xv.

Psychological Elements of the Fiat. 1. First, there is a conscious selection of the course to be pursued. I agree with myself, as it were, that my right hand is to be raised, to be raised so high, so high in front, etc. The end of the desire is clearly emphasized and cleared of all extraneous uncertainties. There is a feeling of the richness of alternative possibilities, of more or less deliberation upon them, and of satisfaction as to the readiness of all the apparatus, as far as my selecting activity can go.

This feeling of preparation by selection and exclusion, of the adoption of the particular alternative for realization, is altogether new in consciousness. There is nothing like it in simple reactive movements There I do not know the real nature either of the stimulus or of the movement till the reaction is an accomplished fact. Here I know what movement I am to make and why I make it. In short, here is a clear, conscious case of end as already found in desire considered as stimulus to will; a sense of *adopting, accepting, ratifying* this particular end as my own present desire.

When the muscles have not before been voluntarily used there is a feeling of separateness, *aloofness*, from the bodily apparatus; of a futile attempt to select. Let the reader try for the first time to move his ear. We feel in this case that we could, if we could only find the right button to press, the right fulcrum on which to rest the lever. There is a distinct consciousness of search, located in the side of the head.

2. There is, second, a feeling of the waxing importance of this end to me in my consciousness. It persists steadily there, grows large, overshadows every other claimant. It is as if my cheeks were being distended by a wind from within —larger and larger, till it is all that I can hold: but still I hold it, and I feel that I alone hold it. No one helps me or hinders.

This feeling of *enlargement*, of absorption in an idea, is

found also in the reactive consciousness. Sometimes an idea emerges uninvited from the background of sensibility, and stalks boldly before the footlights of consciousness, throwing a shadow over all the occupants of the front rows—and holds me against my will. In the present case, however, there is a coloring of feeling flowing forward from the end-feeling (1, above) and backward by anticipation from the fiat-feeling (3, below) which is absent in cases of involuntary enlargement in consciousness.

3. The feeling of *fiat*—Let it be! Let it go! I hold it no longer. The time is come for action and I act. Here the feeling is absolutely peculiar to the voluntary life. It is the kernel of felt self-agency. The outburst of the reactive consciousness is accompanied by a helpless, runaway-horse feeling: but here the outburst is felt as the urging on of a steed well under rein. This is the consciousness of *volition* proper.

4. A feeling of *control* over the muscles: of ability to reconsider, to withhold the fiat. The same feeling extends also to the mental flow.

5. A feeling of antagonism to the muscular system. "I tried to" is urged and accepted as sufficient answer to the charge "you did not act." James has called this element of consciousness the "*dead lift*" of effort, and it is here that *effort proper* seems to be something added to the volition-feeling. The muscles lie like lifeless wood against the outgoing of one's force. It carries with it consciousness of difficulty, resistance, volition and yet stronger volition, with the felt expenditure already characterized.

6. There is an intensifying and enlarging of the relational complex of which the end is a part. By acting we *know* more about the act. The particular reaction gets itself compared with others, throws light on the actor's capacity, precision, strength, and forms a valuable measure for the carrying out of future desires of a similar kind.

7. Finally, we have distinct sensations of *movement* if

the member move: an agglomerate of touch, temperature, and muscular sensations. In normal circumstances, if there be no actual movement, these sensations are not felt.

Physiological Accompaniments of the Fiat. On the physical side we find, when voluntary reactions are well established, certain significant facts.

1. An enormously increased complexity in the muscular apparatus available. This is in most striking contrast to the simplicity and uniformity of reflex and impulsive movements. The latter stimulate particular reactions which are repeated in fixed and comparatively simple muscular arrangements. Voluntary movements, on the contrary, break up, redispose, and reunite the elements of these reactions in numberless ways.

2. There is a direct increase in energy available in the particular muscles toward which volition is directed. Muscles can do more work when they are voluntarily worked.

3. There is greater rapidity, definiteness, and precision of reaction here than in impulsive movements; and this gain is proportionate to the sharpness with which the end intended is pictured. More muscles become available by effort, but by repeated effort fewer become necessary. Repetition tends to improve a voluntary reaction in these respects, since it tends to reduce the carrying out of the pictured end to the type of a compound reflex, the volition only serving to start the flow of nervous energy outward.

4. There is a sustained equilibrium of the motor apparatus as a whole, due to education, and no longer a matter of conscious effort. The infant must learn to hold his head up; and that the adult is really actively engaged in holding his head up all the time is seen in the fact that it falls, he "nods," when he grows drowsy. So the body is in a state of constant muscular tension called by Béclard "static contraction." A little careful attention to the limbs enables one to detect these conditions of tension, and release them

when they are not necessary. One has never learned to rest properly who is not able consciously to throw his muscles "out of gear," so to speak, and sit or lie as heavy as a piece of wood. It is astonishing how much strength is gained by this absolute repose of the muscles.[1]

Psychological Factors in the Neget. There are certain added elements of consciousness involved in an act of negative volition.

1. A sense of strong clash and conflict between a present reaction now operating, or about to operate, and the end which I desire and will. It is more positive than the mere separation felt in the "dead weight" feeling. In this case I am actively opposed: I do not urge a lazy horse on, but I rein a fiery horse in. "I moved, *but I tried not to.*" This is *negative effort proper.*

2. When it is a voluntary reaction which is negated, there is a feeling of "calling one's self off," of withholding the nerve-energy necessary to continue the function. This is *negative volition.* If the function continue it is involuntary, and I oppose it by "negative effort."

3. In many cases there is a feeling of *helplessness* and of casting about for means to circumvent and prevent the nervous discharge indirectly. This goes perhaps as far as an appeal to others to hold the offending limb and prevent its reaction.

4. Finally, there are sensations from the *stopping of movement* in the muscles and joints.

Physiological Accompaniments of the Neget. The physical machinery of negative volition is: 1. The stimu-

[1] The general realization of some means of relieving the "static contraction" of the average American would be a public gain. The writer gains this rest by fancying himself away from all possible interruptions, as lying on shipboard on a smooth sea; it is greatly helped also by consciously imitating the appearances of sleep—breath by slow, deep inhalations and quick exhalations, etc. Every five minutes not actively occupied should be seized upon for such relaxation of the muscles.

lation of the muscles antagonistic to those which realise the reaction negated. The injured party who will not bow to his enemy on the street "leans back for very straightness": when we determine not to smile we produce a contrary grimace.

3. Experiments show, also, a direct relaxation of the muscles whose reaction is negated.

Feeling of Consent. The feeling of consent is denied by many to have volitional significance; yet the fact that it always involves an idea or end and indicates an active attitude toward this end—that is, an attitude rather than mere approbation or belief—controverts this view. I do not consent to the fall of the Niagara River as I behold it pouring out its strength; but I do consent to my child's going to see it. In the latter case there is a clear reference to my will.

Summary on Muscular Effort. Gathering up the elements now seen to be present in effort we find a distinct consciousness of opposition between what we call self and muscular resistance. Consciousness is unmistakable on this point. In the reactive consciousness the ego-feeling is present, but it is of an ego involved in the general tendency of the muscular adjustments. In the voluntary it is an ego which inspects the movement beforehand, selects and approves, or withholds itself and condemns. Whatever the ego be, and whatever we may decide as to the meaning of this consciousness of opposition, it yet exists, and must be given the complete recognition due to such a clear empirical fact.

Muscular Effort and the Attention. The first point mentioned above, as characterizing voluntary movement, was the feeling of preparation; *i. e.*, the relating, selecting, adopting of the end to be realised. Now, as has been shown, this selecting of one of many presentations takes place only in the attention; it is either itself involuntary or itself a fiat. If involuntary, it is a matter of reactive

consciousness, in which case the resulting reaction in movement is involuntary also. When a man acts at random, having no time for deliberation, or perhaps no information to deliberate on—throws a mental penny, so to speak, to guide his choice—his action is not voluntary at all.

In all voluntary movement, therefore, there is an earlier fiat than the will to move, *i. e.*, the fiat of attention to the particular idea of movement. In general, the two forms of volition may be clearly distinguished in consciousness. I may attend as closely as I please to an idea of movement, keep it resolutely before me, and yet not reach a decision to perform it. Yet in the cases in which I do reach such a decision I do so only by concentrating my attention upon the idea to the exclusion of all others. When I am not able to reach a decision it seems to be due to a defect in my attention; other ideas share it with the muscular idea. Consequently it is the degree of preparation, *i. e.*, voluntary attention, which leads to the expansion of a presentation till it so fills consciousness as to overflow in volition. The entire question as to what volition is, is accordingly thrown back upon an investigation of the exercise of voluntary attention. Voluntary movement is only a particular case of voluntary attention.

Development of Voluntary Movement. There are three stages, therefore, in the development of voluntary movement: 1. Voluntary attention to a presentation which, in turn, stimulates a native muscular reaction. This is the state of things in infants' suggestive and imitative reactions. 2. Voluntary attention to a presentation of movement, which stimulates the movement presented. This is the state of things in all our endeavors to learn new muscular combinations, making them our end. 3. Voluntary attention to an end for which a muscular reaction is a necessary means. This takes us back to the first state of things again. By the process of learning (2, above) we have gained new adaptations, and by repetition they have

become unconscious means, just as the native reactions (1, above) are. So in writing, for example. That is, we find, the organism gives us so much (1), we improve upon it by effort (2), and, having patented our improvements, so to speak, we hand them back to the organism again (3).

Theory of Innervation. Any theory of a uniform nervous basis of will admits certain points; *i. e.*, an efferent process following upon a central process, this efferent process stimulating a muscular reaction which is reported in turn to consciousness by an afferent process. A further question arises as to the exact locus in this series of the feeling of effort. Do we feel effort when the energy of muscular stimulation gets ready to leave the brain, or when the incoming processes report actual movements? Put technically, are effort-feelings entirely *kinæsthetic*, income-feelings, or do they involve also feelings of *innervation*, outgo-feelings?

Analogy from the general build of the nervous system, as analyzed above, would lead us to look for an element of consciousness from the outgoing or reacting process no less than from the incoming or receiving process. Evidence pro and con, however, cannot be presented here.[1]

[1] See full references on this debate in *Handbook of Psychology*, vol. II. pp. 249–250.

CHAPTER XXVII.

VOLITION.[1]

Purpose. In the last chapter we found that voluntary movement is only a particular case of voluntary attention. The preparation for movement involves the selection of a particular presentation, and its accomplishment is only a matter of the reiteration of this selection when the proper ideal and motor conditions are present and fill consciousness. For example, I determine at twelve o'clock to dine with a friend at six. I have selected and willed this act; but in the mean time other ideas—knowledge of the hour, present duties, etc.—occupy my consciousness with the intended act. My state of will is then *purpose* or, when it represents a more permanent element in character, *intention*. When six arrives these presentations foreign to my purpose disappear, the dining act alone persists, fills my attention, and I walk to the house of my friend. My volition at six repeats my volition at twelve, except that the two involve a somewhat different background of accompanying consciousness. In both cases I give myself with all its immediate consequences; in one case, these consequences are apparent only in my mental life; in the other, they shed themselves out through my muscles into the physical world. If I resolve to break into a house I am a burglar, though I be arrested before I move a muscle. Hence there is only one fiat, one volition, and that is to give my attention to a presentation.

§ 1. VOLUNTARY ATTENTION AS CHOICE.

Law of Motives. Volition, considered as an act of attention, always involves some measure of division in some

[1] Cf. *Handbook of Psychology*, vol. ii. chap. xvi.

sciousness—some measure of confusion due to unadjusted claims. The various classes of claims which are to be adjusted in an act have been pointed out. They are the springs of action or *motives*, any affective tendencies whatever that represent active conditions of consciousness. My whole personality, as has been made clear, is an expressive thing: its expressive side is as real and elementary as its receptive side. Consequently at every moment the man is expressing himself somehow, and what he is expressing is the outcome of all the elements in him which seek expression.

Farther, the whole of the present possibilities of the man are summed up in these tendencies outward: they represent his entire self at the moment that he acts, *i. e.*, his make-up as the present conditions of his environment are suited to call it out. Given conditions which favor the expression of a number of his motives at once, and they all clamor for exclusive recognition. For example, a brakeman's hand is freezing to the iron; intense pain, a physical spring of action, prompts him to desert his brake. But he quickly calculates the chances of collision, or an open bridge: intellectual motive urging him to remain faithfully at his post. And with this last there come the picturing of wounded passengers, the cries of those in danger—a new emotional motive, which brings with it a warm flood of sympathy leading to a quick and easy decision on the side of duty. The decision is the man's decision; it expresses the nature of this man and no other; and it is the outgoing of his nature in a line which the particular circumstances open to him. Accordingly we may say, first, that *all volition results from a more or less complex aggregation of motives*; and, second, that *this aggregation of motives exhausts the possible alternatives of present action.*

The first position is clear from the analysis of the affective basis of volition above, in which the different stimuli to volition were pointed out. It is impossible that

any one of these should act alone, for a man is never free from his body, on one side, or his higher ideals, on another side, or his emotional tone, on a third. They are all present always in normal life.

The second position shows us that any doctrine according to which a man can transcend his motives, hold aloof from them, despise and reject them, simply asks us to chase a fire-fly. If you remove a man's motives you remove the man; for what is the man but body and mind? The whole content of volition disappears. To will at all a something must be willed, but this something is a pictured something, bearing some relation to myself. The reason I will it is because it moves me—is my motive. Let me picture never so strongly the fabulous—the utterly uninteresting and indifferent—and will in reference to it is impossible. I can never make new motives, nor will a thing that does not for some reason find a responsive echo in my breast.

Nature of Motives. It is also plain that a motive is nothing in itself. It is only a name for a partial expression of the nature of an agent. Consequently motives can in no sense be considered as forces which expend their energies upon the will, or which fight each other. These conceptions of current psychology are nothing short of myths—myths which have "darkened counsel without wisdom" long enough. Apart from the motives there is no will to fight against, and as to struggling with each other—that would mean either that each of the motives had a will of its own or that there was no common life whose full realization is the best satisfaction of them all. Here is a developing principle—call it what we may—whose different life-furthering adaptations represent a hierarchy of worths. One worth is chosen. If it be the best the others are also furthered with it by their very denial; if it be lower than the best it suffers with the others through its gratification; both because, as elements of a common life, all are involved

in the gratification of each. How, then, can they be conceived as separate entities contending in a theater which is cold stone to all of them? Rather they are all vital elements in the functional synthesis of a living consciousness.

Effects as Motives. Among motives two great classes have been distinguished, affects and ends. The former are immediate influences upon the will, unpictured, unreckoned, unavoidable. The latter are reflective motives, pictured, estimated, subject to conscious selection or rejection. Now it is plain that these two classes of motives stand on very different planes in the mental life as regards their volitional worth. If all volition is in view of an end, then it is only by strengthening the influence of particular ends that affects enter. If I grow greatly excited, for example, over a particular choice, my excitement colors my choice only in so far as it presses home upon me one alternative of my choice. My physical health alters my opinions and reactions, not by supplying me a new end, but by brightening a consideration here, dulling another there, rendering the attention sluggish, and so limiting the range of my consideration, or stimulating it greatly, and so pitching the entire intellectual play at a higher key. What actual volition is concerned with, therefore, is ends and ends only.

Volitional Apperception. How, then, does an end pass into a volition—how does it get the fiat which makes it an act? Careful questioning of consciousness leads us to see that the picturing of ends is in no respect different from the picturing of anything else. It is an ordinary act of apperception, by which new elements of conscious content are taken up in an integration with the old established complex of presentation. The new end gets in only as far as it is adjusted and harmonized with old ends; the old ends themselves, a single integrated group, take on a new complexion from the new element of experience thus absorbed. The attention moves throughout the series of

elements, grasping, relating, retaining, selecting, and when the integration it effects swells and fills consciousness—that is the fiat. Just as soon as the elements of the end-complex cease to act as partial influences, causing the movements of attention by their own vividness, and the attention gets its hold upon its integrated content as a grand related *situation*, the fiat goes forth.

For example, I have been accustomed, after careful thought, to pursue a given line of business policy. It is the outcome of all my thinking, feeling, and past action—an integration, a motor situation, which exhausts my motives and represents my present volitional attitude. A friend gives me new information; it gets an entrance by its own intrinsic hold upon my attention; it becomes an element in the situation; every other element gets a new adjustment; and when I make up my mind again, get control of the situation through relative stability in the apperceptive outcome—then I am at once in action—my fiat is given.

Now no one end has brought about this result. I do not adopt one and utterly deny others. I adopt the situation in which all have entered and to which they have given each its own significance. It is true that the exigencies of conduct narrow me down to a very small number of expressions. I must either go to the opera or stay away. But neither alternative represents my true mind. I decide to go, *provided*; to stay away, *if*; and whichever I do it is with the clear consciousness that I am not realizing my ideal volitional situation in the premises. Instead of indulging one of my ends I am acting on a compromise, which really satisfies none.

Volitional apperception, therefore, differs from general apperception only in its explicit motor reference. This reference, as has been seen, is present in all apperception; no state of consciousness lacks it. But when I have action in view the moving quality of the elements of my synthesis

is more felt. Generally, my decision is simply consent—the passage of "the adopting act." I consent to a thing when I give it my sanction. This is volition; but not as full a volition as the volition of conduct. When I know that my own fate is involved, that it is I who must act, there is a fulness of emotional warmth and reality that gives new affective coloring to the ends involved, and perhaps radically alters the outcome.

Controlling Motive. The controlling motive, consequently, is the motive which wins the fiat. But it is very difficult to find anything that it controls. It does not exist at all after the fiat, for the outcome of the fiat is a new end in which all the motives have entered. So it does not control conduct, which is the expression of the fiat. For the same reason it does not control the volition itself. Every one of the motives is controlling in the same sense, *i. e.*, of entering essentially in the result. The only advantage it has over other motives is that it becomes the final channel of expression in conduct, an advantage denied to them. In this sense it controls the other motives, but only in this sense.

Deliberation. The state of division, balance, and indecision described is ordinarily called *deliberation*. Its nature is now sufficiently clear. Its duration depends upon the complexity of the considerations which arise, the evenness of their motive influence, and the absence of pressing urgency of choice. Individuals vary greatly in the thoroughness of their deliberative processes. As a rule, deliberate, slow decisions are safest, though, as has been seen, it is possible that an unexpected flash of conceptual feeling may carry the day in favor of an unseen aspect of truth. An important additional motive in deliberation is the state of mind called *caution*, arising from a sense of the danger of hasty decision.

Choice. Choice is the fiat itself—the adopting act—as it terminates upon an end. It is volition considered not as

the general form of will, whatever content it may be exercised upon, but a particular volition upon one of alternative pictured ends. A choice is always a definite particular choice. And it includes, as a phenomenon in consciousness, the feeling of the continuance of the partial ends which enter in deliberation. It does not quench one desire to resolve to satisfy another. And the intellectual act of apperception, whereby the course chosen is constituted, may find itself in need of constant reiteration to maintain itself. We need to be constantly reminded of the reasons of our faith in order not to lose it. The greatest moral victories are subsequently lost through the stolen march of a desire or impulse once successfully subdued. Choice, therefore, is the feeling of the settlement of a question which is still a possible question. It is a volitional declaration with a felt interrogation. As soon as our decisions pass out of the range of consideration they are not properly choices any longer; they become, then, elements in character.

Potential and Final Choice. In regard to the performance of a course of conduct two stages or aspects of choice may be distinguished, *potential* and *final* choice. By potential choice is meant a man's decision as far as it results from his own character, disposition, personal preferences, etc. Potential choice covers the whole range of affective motives, the dumb, unpictured influences which get in their work silently. It includes also the ends which one's own character, memory, knowledge supply; in short, it represents the decision I reach when "left to myself." It is potential choice that we feel sure about in reference to our friends; it is more approximately a constant thing from day to day. It represents the great currents of our lives, the habitual lines of activity, opinion, and interest, of which more remains to be said below.

Final choice, on the contrary, is real choice, active choice, acting choice. It is the full outcome of deliberation from whatever sources considerations may come.

It is the adjustment, the compromise, as it was called above, of all the actual circumstances of the case. It is choice as a spectator looks at it and asks, what did he do? Not, what did he personally most wish, or did his action satisfy his ideal situation? It is, further, in the later stages of deliberation that potential choice suffers the revision which makes volition actual. It is brought about by the more unessential, the less interesting considerations. Many a fond wish is murdered by the present demands of cruel circumstance. It is also here, in the more or less open interval between potential and actual choice, that the estimable qualities of *open-mindedness* and *ingenuousness* appear. The open-minded man is receptive to new suggestions, arguments, and emotional appeals. His habits of action have not become so petrified about him as to block up the channels of new volitional reaction. Others "are not so, but are like the house which is founded upon a rock." Nothing but an earthquake can shake the man whose potential equates with his actual choice regularly.

Feeling of Alternatives. The feeling of open alternatives which is said to characterise choice rests, when an act of volition is closely scrutinized, in one of two places: either before the volition, that is, during deliberation, or after it. Before volition the possible alternatives are actually present as candidates for the position of controlling motive. We know that one of them, and only one, will be the final channel of expression. Any one is eligible for this. They are really alternatives also in the sense that the outcome is not yet foreseen; consciousness has not yet reached the stage at which there is any outcome at all. But these two considerations exhaust the meaning of felt alternatives before volition. This feeling is further complicated with that of obligation.

After volition, as already said, the motives persist. The circumstances of deliberation throng back upon us; especially after a hard, long-fought decision do we live by

retrospection in the past. But further than this, we feel that another revision is possible; that new light may come to us, and our decision may be reversed. Here, again, therefore, are two senses in which alternatives are felt: one, the persistence of the conditions of a choice already made, the *Nachklang* of our effort, the drifting smoke of the battle-field; the other, the gathering again of the conditions of choice, the preparation of a new issue. This latter, therefore, is identical with the similar feeling before volition. Accordingly the feeling of alternatives is always a sense of *contemporaneous motives or of reminiscences of such.*

As to volition itself, however, it is accompanied by no feeling of alternatives. On the contrary, it is felt as a peculiarly exclusive, definite, intolerant thing. It terminates alternatives, and fills consciousness with a single, apperceived presentation. As Ribot phrases it, voluntary attention is a state of monoideism. If I attend to two things at once it is because I will both things; together they give the end. The end itself is one and undivided. This cessation of deliberation is accompanied by an emotional coloring of relief which is highly pleasurable; and it is in sharp contrast to the unpleasant tone of conflict which characterizes indecision.

Moral Choice. Moral choice involves the moral impulse as a motive principle. In decisions in which moral feelings are not involved this principle is practically absent. As soon, however, as the coefficient of the right in conduct is, or is likely to be, disregarded, a new coloring is given to all the phases of the act of volition. In addition to the consideration of expediency, which is the unwritten law of choices morally indifferent, the consideration of right enters through the ethical feelings. Each pictured end has its value as relatively fit or unfit for construction in an ideal of conduct.

There are two peculiarities about the moral motive,

however, when considered as entering among the factors of deliberation. First, it is not itself a pictured end alternative to other ends. We have found that the moral ideal is not presentable. It is rather realized in the relative adjustment of other ends to one another. Consequently the moral motive is not realized by withdrawal from the ordinary conditions of action, or by its own abstract pursuit; it does not present for itself a distinct channel of expression. It enters to dignify and justify one of the ordinary series of alternatives, as of more worth in a scale of moral values.

Second, the moral motive, as said in an earlier connection, carries with it the felt authority of a categorical imperative. I may decide on the expediency of a course and then disregard it, with no blame, no remorse; but when I decide on its rightness this very decision is a recognition of an authority beyond which there is no appeal.

Choice and Habit. In the sphere of volition, as elsewhere, the law of habit has striking applications. Ends tend by repetition to coalesce with one another. Complex series of volitions become so closely integrated that a starting fiat is all that is necessary to bring about a series of well-adjusted motor reactions. Here, again, two great views of habituation open before us. First, the voluntary shifting of attention, the effort to select, arrange, accomplish, becomes unnecessary by the law that association takes over the work of intelligence. Thus the surface of consciousness is made more calm from moment to moment, and the attention is left free for new fields of exploration. Such a combination of elements in a single voluntary movement we may call an *act*. Thus opening a book and turning to the place desired is an act; but it represents innumerable efforts, failures, and partial successes extending over years of child life. An act is what was called in an earlier connection a "motor intuition."[1]

[1] Above, p. 126.

Second, these acts get aggregated in like manner; lose their individuality in what are called *dispositions*. Our acts grow more and more alike; our day's devices become routine; our satisfactions vary with our education, and fall back under the lead of impulse. Nothing, in short, in which our agency is involved escapes the solidifying, unifying effects of habit.

The result is that ends get back to the status of affects, and our voluntary life becomes more limited in the range of clear consciousness. Even the power to rebel against a habit is itself a matter of habit. A habit is hopelessly fixed when there is no disposition to break it up.

Hence the extreme importance, on the part of teachers, of a clear understanding of the laws of volition in its early rise and progress. Variety should be everywhere provided in the tasks for children. Choices which involve self-denial should be dwelt upon, illustrated, and encouraged. No pains should be spared to give the child an intelligent view of the claims of others upon him, in order that the habits which he does form may be beneficent and moral.

Intellectual Effort: its Forms. Effort to accomplish an intellectual task is characterized by the marks already found attaching to muscular effort. Indeed the latter is but a particular case of the former. The effort to keep up a train of thought, to suppress an emotion, to bring order and coherence into the mental flow, has the same feelings of fiat, dead-lift, resistance already found in the earlier case. If we can manage to keep the attention well fixed upon the object of desire the battle is won—it swells and fills consciousness, and wins volition.

Special forms that more intellectual effort takes are *resolution, determination, perseverance, doggedness*: all the manifestations of so-called strength of will. They all express the more or less habitual exercise of attention as it gains control and comes to characterize the individual.

They refer more especially to potential choice, as reflecting character.

§ 2. Character.

The conception of character, apart from the metaphysics of it, properly attaches to the active side of personality. It means the essential part of a man, that which is most himself, but it is interpreted, like everything else, in its expression. Action is the only and the adequate expression of a man. So character means the present agent, the possible actor. The notion also includes the idea of permanence. Character is that expression of a man which is most constant, habitual, and, in consequence, most unconscious, unpremeditated, genuine.

While the most permanent expression of personality, nevertheless character is not a stationary thing. It is a progressive, developing thing. Especially in early life the change and development of character are superficially evident and present the only adequate statement of the problem of education. As has already been seen, the growth of mental function as a whole waits in early life upon the growth of the physical organism; in later life it becomes more independent, developing under the law of volition; but in both cases it is still, with the physical organism, subject to influences from the conditions which envelop the personality as a whole.

We may speak of the "innate gift of nature" as a man's *endowment*, that which he starts with, received by inheritance. It includes all his potencies for development as far as they can be conceived apart from the external conditions in which alone they can be developed. On the other hand, the sum of these external conditions from birth upward, considered as influencing character, we may call *environment*.

The question as to the nature of present character is accordingly this: what is the law of the development of

a man's endowment in relation to his environment? Two great principles already arrived at find further application here, *i. e.*, the principles of *adaptation* and *habituation*.

Development of Character through Choice. It is by choice that these principles get their application. Choice plays the part in the development of character that nervous reactions play in the development of the sentient organism. Nervous reactions were found to be to a degree selective and adaptive; and further, it appeared that such adaptations become fixed in structure by the principle of habit. So choice is selective and adaptive, and its reactions create tendencies toward those habitual performances which are the outcome of character.

It is in final choice that the reaction of endowment upon new environing conditions becomes evident. A man's potential choice represents that which is already in him. Any modification of potential choice is due to influences from without, to environment. The consequent reaction tends to identify the man with the new consideration before foreign to him. He has taken it up in his deliberation, given it a place in the list of motives which appeal to him, and thus disclosed a desire, whim, preference, now more important to him because he once has harbored it. Character, accordingly, as an expressive thing, has thus taken a step in its development through *adaptation* to its social environment.

The potential choice of a man at any time, therefore, represents all the final choices of his past life. Each link in the chain of volitions, from the present back to his first exercise of choice, has involved these elements. The very first act of choice of a human being is already expressive of the accommodation of himself to his circumstances. Indeed, it is through the stress of circumstances, through the necessity imposed by muscular resistances, violent pains, and crying appetites, that volition in the first place takes its rise.

Further, it is easy to see that environment enters in the development of character in three ways. First, the way we have already seen; it presents new ends for choice. Second, it becomes a conscious influence over our prospective choices. We decide our questions subject to future light, circumstance, fortune. The character thus grows pliable, the will cautious, action hypothetical. This result of environment is a more complex and refined application of the law of *habituation*. Where uniformity of experience prevails action grows habitual. Where lack of uniformity prevails distrust and caution grow habitual. The latter is more unusual, since uniformity is more easily seen and accommodated to; but it is equally real—the tendency of reflective thought upon the relative values of experiences, to make men skeptical in their opinions and unenthusiastic in their deportment. It simply means that indecision, which is the enemy of habit, paralyzes volition; for habit makes volition spontaneous and impulsive.

Third, the principal influence of environment is undoubtedly before and during the early rise of volition. In very early childhood authority is the controlling influence in molding actual choice, and thus in fixing character. So important is this that some writers find in the "word of command" the foundation of all subsequent authority, moral as well as legal. However this may be, the observation of children shows to what a remarkable extent the authoritative suggestion of a parent sets the inclinations and forms the habits of his child. Even in the matter of physical appetites likes and dislikes may be to a large extent controlled. Imitation and suggestion start reactions which become habitual. The unconscious lesson of a bad example learned by a child from his father is one of nature's most impressive pieces of moral instruction. Moral contagion of character is as direct and unconscious as physical contagion of disease. Further, early social conditions, family, school, and play associates, create a *milieu* which

makes endowment practically helpless as to the methods of its expression during the early years of life. Educationally the tremendous influence of environment is the more apparent since it is just at this period that the child begins to reach those conceptions which serve as point of departure for moral feeling.

§ 3. Initiation of Motives by Attention.

Coming closer to the actual method of voluntary attention, we seem to find a wide range of apparent exceptions to the law of motives as now stated. The attention, we know, intensifies a mental state. It is possible simply by dwelling upon a consideration to increase its importance to us, to give it preponderating influence in our deliberation, and, finally, to convince ourselves of its supreme desirableness. It looks, if not like the initiation of new motives by the attention, at least like the initiation of new intensity in old motives. This effect is further exaggerated by the fading out of other motives in consequence of the withdrawal of the attention from them in favor of the "star actor." The important question is: Is this exercise of the attention itself unmotived? independent of the conditions of endowment and environment already pointed out? This question must be answered in the negative, for several reasons.

1. Such a result often follows upon the involuntary exercise of the attention. By a sudden stimulus from without the attention is shifted, leaves the chain of deliberation, dwells upon an alternative before subordinate, and so changes the throw of volition. A burglar greedy of gain contemplates a robbery, but a harmless noise starts associations which suggest danger, and he deserts his enterprise. Any incident which arouses the attention from its line of easiest passage, and gets it concentrated upon a different train, is apt to modify choice. So lawyers aim to divert the attention of jurymen from the claims of mercy by

exhibiting bloody weapons, dwelling upon terrible incidents, and thus getting the attention under the lead of strong emotion. In these cases there is clearly no factor apart from the environment and the elements of character which respond to it.

2. It seems possible to divide all cases of such apparent initiation of motive intensity into two classes: one, the cases of involuntary attention mentioned, and the other, cases of deliberation. If I have no intention at all in the matter, no trace of preference for the motive whose intensity is strengthened, then it is clearly involuntary—a matter of the reactive consciousness. But as soon as any such preference comes in—any physical, mental, or emotional motive for wishing to intensify this particular alternative—then my choice is already made, and I am fooling myself in thinking that I am reaching an unbiased decision. Most of the instances are of this latter kind. They are the becoming conscious of the great class of volitional stimuli already described as affects. Habit, for example, becomes conscious in its influence on volition; vague physical and emotional states which are never distinguished from the fundamental tone of our personality reveal themselves thus, as elements of it.

Hence we may conclude that this phenomenon is only a phase of the general mystery of attention. By attention deliberation takes place, and choice is the outcome of this deliberation. When we are absolutely outside the range of deliberation, instead of finding ourselves in the presence of altogether unconditioned activity, we only revert back to activity of the reflex type.

§ 4. Freedom of the Will.

In the light of the foregoing the problem of the freedom of the will takes at least an intelligible form of statement. Freedom of the man is perhaps a better way of stating it. Yet the term freedom suggests a comparison with the

conditions of physical causation which is essentially misleading. The statement of the following alternative views may suffice to bring out the real point at issue in the free will controversy.

I. **Indeterminism.** On this view of volition choice is absolutely *unconditioned.* The will, or the agent through the will, asserts itself as it sees fit: it is in no way conditioned either upon motives, brain activities, or external circumstances. Pure indeterminism is also called **accidentalism.** In opposition to such a view of volition it may be said:

1. It is altogether unpsychological. The most thorough search of consciousness discovers no such cases of absolutely unmotived choice. 2. It leads logically to one of two alternatives: either the will has no relation whatever to its social and physical environment, in which case it can have in turn no influence of any kind upon it, or it moves by chance, whim, caprice, which if true would violate the uniformity and stability of character. 3. It is altogether unnecessary for the purpose for which it is usually urged, *i. e.*, in the interest of moral responsibility and obligation; for an unrelated will would be responsible to no authority, and a will that moved by chance would know no law. Indeterminism is claimed chiefly by those who fail to see that in holding volition to be motiveless they cut off the agent himself from all voluntary expression.

II. **External Determinism**: the view of all those who by any method bring volition within the chain of natural cause and effect; all who hold that there is no activity in the voluntary or relational consciousness not reducible to motive *forces.* On this view, that is, motives are forces in reference to one another, effects in reference to the brain in which they have their causal support: volition is the consciousness of the outcome of a conflict of forces. It is part of the "epiphenomenon" theory of consciousness already explained. This theory in turn evokes several criticisms.

1. The theory begs the difficulty of passing from the

external to the internal—from a brain process to consciousness. It forgets that this gulf has not been crossed. To assume a uniform psycho-physical connection is a very different thing from assuming that consciousness is an epiphenomenon. If determinism ever be established at all it will be a determinism which reduces volition to other states of consciousness, not one that presumes to blot out consciousness altogether.

2. After we get in consciousness we have no right to apply the law of physical causation to motives. It is a most wanton assumption from every point of view, except that of physical analogy. Motives persistently elude the application of the symbolism of natural causation. Where in the play of motives is the law of resultant? Statistics showing uniformity of marriages, crimes, etc., in a community, simply prove that men have a common nature, and are appealed to by common motives; and that variations of choice positive and negative equate with each other. The same is true of the number of drowning accidents on the seacoast, and it would be just as logical to claim that all who were drowned were pushed into the water and held under as to claim that uniformity in the aggregate indicates cause and effect in individual choice.

3. Physical causation presents us no analogy to the selecting, intensifying, abbreviating, and synthesizing activity of attention. As far as the analysis of physiological function has gone reflex action is its purest type; yet even in the cerebral processes which underlie volition directive modifications of the reflex have to be presupposed. Even though the law of conservation sweep through the brain, as we hold it does, yet it is only when selective consciousness is present, and presumably because it is present, that the resulting reactions are what they are. In order to prove the position, apperception would have to be reduced to association, and association made a function of cerebral dynamics only

4. As a matter of fact, we know no external influence which can compel the will. When we do influence another it is by previous knowledge of his inner character—the mental habits spoken of; but that, at its best, is by no means a certain device. It is true that if there were no other consideration against motive determinism this fact might be considered due to the complexity of the forces involved; but in the fact of the conscious synthesis of choice it seems to have a readier explanation.

III. **Immanent Determinism.** This doctrine holds that there is in man a principle of *realization*—the realization both of himself and of an universal consciousness through him. In volition this principle attains advancement. The innermost nature of a man is, therefore, necessarily expressed in every act of choice. It is a free expression of what the man is, and, consequently, of all that he represents as part of the world; but it, at the same time, unconsciously realizes a broader development in which all individuals are factors.

As far as this theory is psychological it is tenable. Whatever is immanent must be included in the nature of that in which it is immanent: so volition is, after all, for psychology, simply the expression of the nature of the man himself. It is, however, a metaphysical doctrine.

IV. **Freedom as Self-Expression.** Our view is now narrowed down to very strait limits. The consideration of motives has led to several determinations: 1. Choice is never motiveless. 2. The end chosen is always a synthesis of all present motives, and is adequately expressed by no one of them. 3. This synthesis is an activity *sui generis*: it finds no analogy in the composition of physical forces.

These positions find their only explanation in the supposition that the existence back of choice includes in its own nature both the motives and the volition. The motives do not grow into volition, nor does the volition stand

apart from the motives. *The motives are partial expressions, the volition is a total expression of the same existence.* How the motives pass into or stimulate volition—that is the law of mental development. The relation of this law to brain development is again a higher exhibition of that psycho-physical connection which has been assumed—a connection which is real, but which yet does not prejudice the laws of development on one side or the other. As has been said, this seems to point to some underlying unity in which the antithesis between the mechanism and volition is resolved.

Freedom, therefore, is a fact, if by it we mean the expression of one's self as conditioned by past choices and present environment. It is not a fact in any sense which denies that volition is thus conditioned, first, upon the actual content of consciousness as it swings down the tide of the personal life and presses outward for motor expression; and second, upon the environing circumstances which draw the motor consciousness out. Free choice is a synthesis, the outcome of which is, in every case, conditioned upon its elements, but in no case caused by them. A logical inference is conditioned upon its premises, but it is not caused by them. Both inference and choice express the nature of the conscious principle and the unique method of its life.

Feeling of Freedom. The feeling of freedom seems to be made up of two other feelings about equally, *i. e.*, the feeling of alternatives and the feeling of agency or power. The latter is rather a felt reminiscence than a state of original sensibility. It rests largely upon memory of past stimulations or inhibitions of the movements now alternative to one another. Preyer holds that there is true will only when there is positive inhibitory power over the movement in question in each case. This is clearly not the case in imitative volition, when the movement is attempted for the first time: but yet in these cases past volitions of other movements are sufficient to give the memory of

power. It is probable that this feeling of power or agency gets rapidly generalized away from muscular movements in particular, to alternative ends to which muscular reactions are only means. The feeling of alternatives, as has been seen, also goes before volition, or is also due to reminiscence. Hence the feeling of freedom is subject to the criticism already urged against the sense of alternatives; it depends upon the division in consciousness which I feel it is for myself, my own apperceptive activity, to solve in the future. At the moment of volition there is no feeling of freedom. Rather, when the fiat goes forth, there is a sense of irrevocableness, of once-for-all conclusiveness—a feeling of having thrown one's self over a moral precipice.

Feeling of Responsibility. As soon as an act has taken place a new phase of feeling arises, that of *responsibility*. It arises only when the stimuli to will have been stamped with the seal of one's private ownership. I do not feel responsible for my desires, impulses, emotions, except as far as I have ratified them at some time by my choice. Responsibility is a feeling of a past explicit choice, just as freedom is the feeling of the possibility of such a future choice. As attaching to all final choice, this feeling is called *natural* responsibility. It is only the sense of ownership in the deed and its consequences. When the motive conditions include a command imposed by an external authority it becomes *legal* responsibility; when the imperative of duty is a felt condition in the decision it is *moral* responsibility. The feeling of moral responsibility for wrongdoing passes quickly into *remorse*.

§ 5. Effects of Volition.

Expressive Effects. The immediate effects of voluntary attention have already been briefly mentioned. Physiologically, we find certain sensations of concentration in the head, principally at the sense organ through which the stimulus is received. The skin of the head is drawn for-

ward and knotted on the forehead, in visual attention. Experiments show an increase in the blood supply in the organ attended to. In attention to a picture of imagination, or in attentive thought, the eyes roll upward and around, and there is a feeling of exploration or searching in the back of the skull. In strong effort, moreover, there is a setting of the epiglottis and a compression of the jaws. All these indications are additional to the explosive or inhibitive effect to which the effort itself is aimed, and which it in so far accomplishes.

These expressive changes are rather the accompaniments than the effects of attention. They bear much the same relation to volition that emotional expression does to mental excitement. They are, in the main, common to reflex and voluntary attention and can be artificially produced. A brainless animal can be stimulated in such a way as to show the expression of high attention.

Effects Proper. The more legitimate effects of voluntary attention are the muscular contractions and inhibitions which follow it. Attempts are being made to bring these also under the conquest of artificial production, the belief being that volition as a self-determining thing will then go to the wall. Féré claims that the increase in force, rapidity, and precision of movements voluntarily attended to may be brought about by mechanical means (weights, high air-pressure, lying posture, etc.), the additional force coming from other parts of the system. Béclard contends that the extremest muscular tension is found in the immobility or static contraction characteristic of voluntary attention, and that the attention *is* this extreme expenditure of nervous force; he points to the fact that the *diffusion* and repose of attention is at once the relaxation of all muscular contraction down to the complete inactivity, on both sides, seen in sleep. Loeb and others find that when definite motor centers are destroyed there is a prolonged period of inertia in the limbs affected; more voluntary effort has to

be made to move them. This is held to indicate that effort is the drawing of nervous forces from other regions. Chauveau finds it possible to produce the voluntary co-ordinations of movement in walking, in animals, by stimulating certain sensor nerves.

As to the experimental endeavor, there is no reason that it should not be to some degree successful. Why should not there be—indeed, must there not be?—a physical antecedent to every such physical change? and why may not physiology in some cases discover it? But when there is such an artificial production of the efforts of attention, what does it prove concerning volition? It only proves that conservation holds in brain activities, a position readily enough admitted. Volition might be the one law of mental development still, on either of the hypotheses already advanced to explain the relation of consciousness to the nervous system.[1]

Physical Control. The extremely complex system of checks and counter-checks which we call *physical control*, in adult life, has had a slow development. Assuming the directive influence of consciousness, becoming explicit in the early efforts of an infant, we find that it avails itself of the general sensori-motor law already noted under the head of suggestion. The basis of all consists in spontaneous, reflex, and instinctive movements. Such movements, when painful, tend to subside by the immediate inhibitive effect of pain. When pleasurable, by a parallel law, they tend to continue. Thus a link is formed between sensation and movement whereby memories of pleasures and pains become stimulants to adaptive reactions. Such a primitive law of self-preservation is seen in lower orders of life, where there is no deliberative choice, and where the conditions are such that a very narrow range of adaptations suffices to continue the creature's existence. But with the human infant this is altogether insufficient. The extraordinary complexity of the life for which he is destined renders necessary a mag-

[1] Above chap. v. § 4.

cular pliability which cannot wait upon the exigencies of accidental or instinctive motor experience. Hence his long infancy is spent in strenuous effort. To his natural aversion to pain he adds deliberate contrivance to avert it; to suggestion he adds persistent imitation; to experience he adds voluntary experiment. And all his education is supported by instruction from without. The muscular system is thus brought under voluntary control generally, so far as to subserve the demands of life; and in particular directions, farther, as employment or preference demands it.

Such control extends to the inhibition in part of many reflex functions, such as coughing, sneezing, shivering, etc., reaches to some few of the automatic processes, and tends to break up instincts and dispose their elements differently. Only those muscles are available for will which have organic connection with the cerebrum. Some of the available muscles of the body, however, never come under voluntary control, because they are not of use. For example, the muscles of the ear may be made available for moving the ear voluntarily after repeated effort.

Moral Control. Similarly the impulses and desires are brought under a law of reasonable activity. The lawless indulgences of childhood partly correct themselves by their natural penalties. But in this sphere conflicts between immediate and remote results render the pleasures and pains of experience altogether inadequate as a guide of life. The balancing of results which is the slow work of prudence is supplemented by the counsels and forced precepts of teacher and parent. Obedience is the schoolmaster to self-restraint. And gradually reverence for persons becomes reverence for moderation, and obedience passes into *prudential* control. *Moral* control is in its development closely connected with prudential; but, as has been seen above, it finds its law of operation in the moral imperative which sets its own type of obedience and administers its own sanctions.

Further, just as physical control passes into the state of subconscious innervation and contraction necessary for the uprightness, due balancing, and habitual adjustments of the body, so with mental and moral control. The well-harmonised mental life is a life of regulated flow: imagination is adjusted to fact, association held in to the requirements of logical procedure, emotion restricted to its due impelling influence, will moderated by deliberation. All this is a gradual outcome, and the final result takes its coloring from the degree of mental equilibrium we consciously attain by our individual choices and efforts. Volitions conform more and more to the rule of a guiding intention, right or wrong. Just as in the sphere of sensuous feeling there is a fund of common fixed sensibility, cœnæsthesis, so in the mental sphere we find a similar fund of relatively permanent will-stimulus, a conceptual cœnæsthesis, so to speak, or *temperament*. Thus, also, moral choices become habitual, and rightness of choice passes into virtue of character.

§ 6. Rational Aspects of Volition.

Intuition of Power. The rise of the intuition of power has already been briefly indicated. The above analysis of effort reveals to us the concrete fact—voluntary attention—in which it ultimately rests. Whatever their metaphysical validity may or may not be, we reach the ideas of self-agency and other-agency through efforts of our own against resistances. Just as space and time are revealed as intuitions through intellectual synthesis, and just as ideals are felt apprehensions of truths which lie beyond intellectual construction, so in volition we must recognise a regulative principle of agency, or *power*, which is the essence of experiences characterised by the term "will."

Intuition of Obligation. The categorical nature of the feeling of *obligation* has also been noted above. We

found that duty was imperative and, in its form of command, universal. In other words, obligation is a regulative and constitutive principle of the activity of will. Given the right, the *sense* of our obligation to perform it is the most unequivocally binding thing that we mortals know.